· 中英文对照

SHUXUE
JINGSAI

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（初中版）

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策划者寄语

如何将 1、2、3、4、5 和 6 分别填入下列各方格中，使其计算式成立。

□□
× ?
□□□

在垒球比赛中，狮子队、老虎队、骑警队和皇家队 4 个队相互之间都要进行四场比赛，并且胜一场得 3 分、平一场得 1 分、输一场不得分。比赛结束后，狮子队得 22 分、老虎队得 19 分、骑警队得 14 分、皇家队得 12 分。问比赛中一共有多少场为平局？

这些从《国际中学生数学竞赛试题集粹》中选出的，看似简单的数学试题可能会让初中生认真思考一段时间。

数学是自然科学乃至人类文明发展的基础。基础教育阶段，尤其是初中和高中的数学教育一直受到各国政府和教育界的高度重视。美国和加拿大等国家每年都为初中、高中各年级的学生举行全国性的数学竞赛，以考核和培养学生们的基本知识、创新思维能力以及分析问题和解决问题的实际技能，以达到为名牌大学输送高素质学生的目的。

我国教育部 2000 年颁发的有关数学教学大纲，着重强调应对青少年进行素质教育，培养学生的创新精神和实践能力，以更加有利于学生的全面发展，并在坚持贯彻党和国家教育方针的同时，逐步与国际数学教育接轨，为国家社会、经济和科学技术的跨越式发展培养一流人才。

为适应这一新的形势和教育与国际接轨的需要，我们出版由戴筱逄（美籍）博士主编的《国际中学生数学竞赛试题集粹》丛书。戴筱逄长期担任美国路易斯安娜州教育厅中学生教学和考评部主管，丛书中的许多试题也是从由其主编参与设计、北美普遍采用的数学竞赛试题中进行取舍、加工和编撰而成。竞赛试题的选择着重体现了对数学基本知识的掌握和灵活应用，以考核和培养学生综合运用知识的能力和善于创新的思维。本丛书为各年级中学生提供了按国际标准检测自己数学水平的机会，也为广大教育工作者和家长打开了了解国际数学教学的窗口。本丛书保留原版纯正的英文，有专业词汇和日常词汇约 8 000 个，日常和书面用语 6 000 余条，涉及到日常生活的方方面面，可帮助中学生熟练地掌握和应用英语，并为中学生的出国深造及参与国际交流打下坚实的基础。

策划者热诚欢迎广大师生和家长反馈意见和建议，并且希望为共同打造 21 世纪的一流人才贡献力量。

策划者

2005.11

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第一部分

试 卷 一

Test 1

1. 珍妮买了一个标价为8.80美元的计算器。如果购买税为5%,则计算器的总价是多少?
(A)0.44美元 (B)8.36美元 (C)9.20美元
(D)9.24美元 (E)13.20美元

2. 两个人玩纸牌游戏,每盘赌注是0.10美元。最终一个人赢了3盘,另一个人赢了0.30美元。问两人一共玩了多少盘?
(A)6 (B)7 (C)8
(D)9 (E)信息不足

3. 一杂货商用162桶面粉交换了54桶糖。每桶面粉的价值是6美元。问每桶糖的价值是多少美元?
(A)2 (B)9 (C)15
(D)18 (E)27

4. 从777开始,一个学生按间隔为7倒数数777,770,763,……问会数到下列哪个数?
(A)41 (B)42 (C)43
(D)44 (E)45

5. 汤姆一生中的四分之一时间是作为一个小孩,五分之一作为一个青年人,三分之一作为一个中年人,过退休生活13年。问他一共活了多少年?
(A)42 (B)56 (C)60
(D)120 (E)上述答案都不对

6. 5个苹果和3个香蕉共花费2.47美元。如果苹果和香蕉的单价互换,则总共要花费3.13美元。问6个苹果和6个香蕉要花费多少钱?

1. Jean buys a calculator whose price is marked as \$8.80. If the tax on the purchase is 5%, what will the total price be for the calculator?
(A) \$0.44 (B) \$8.36 (C) \$9.20
(D) \$9.24 (E) \$13.20

2. Two men play a card game for which the stakes are \$0.10 a game. At the end, one has won 3 games and the other has won \$0.30. How many games did they play?
(A)6 (B)7 (C)8
(D)9 (E)Not enough information

3. A grocer trades 162 barrels of flour valued at \$6.00 a barrel for 54 barrels of sugar. What is the value of a barrel of sugar?
(A) \$2.00 (B) \$9.00 (C) \$15.00
(D) \$18.00 (E) \$27.00

4. Starting at 777 and counting backwards by 7s, a student counts 777, 770, 763, etc. A number that will be counted is
(A)41 (B)42 (C)43
(D)44 (E)45

5. Tom lived a quarter of his life as a boy, a fifth as a young man, a third in middle-age and 13 years in retirement. How old was he when he died?
(A)42 (B)56 (C)60
(D)120 (E)None of these

6. Five apples and three bananas cost \$2.47. If the price of apples and bananas was exchanged, the same amount of fruit would cost \$ 3.13. How

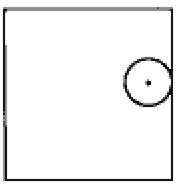
(A)4.20 美元　(B)4.24 美元　(C)4.40 美元
(D)4.80 美元　(E)上述答案都不对

7. 在一个宴会上，每 2 个客人分享一盘米饭，每 3 个客人分享一盘汤，每 4 个客人分享一盘肉。若一共有 65 个盘子，问有多少客人出席了宴会?
(A)42　(B)56　(C)60
(D)120　(E)上述答案都不对

8. 100 个玻璃球放在 3 个碗中，第 1 个碗和第 2 个碗中球的总数为 56 个，第 2 个碗和第 3 个碗中球的总数为 70 个，第 3 个碗中有多少个球?
(A)24　(B)30　(C)36
(D)44　(E)信息不足

9. 某一班 20 个学生在一次考试中的平均成绩为 66。另一班 30 个学生的平均成绩为 56。两班一起的平均成绩是多少?
(A)58　(B)59　(C)61
(D)62　(E)上述答案都不对

10. 一个半径为 2 的圆沿着一边长为 10 的正方形内边滚动一周。问圆心经过的长度是多少?



(A)16　(B)24
(C)32　(D)40
(E)上述答案都不对

11. 定义 $a\times b$ 为 $2a$ 和 $a+b$ 两值中较大的一个。那么 $(2\times3)\times(3\times2)$ 等于多少?
(A)9　(B)10　(C)11
(D)12　(E)上述答案都不对

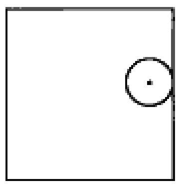
much would six apples and six bananas cost?
(A) \$4.20　(B) \$4.24　(C) \$4.40
(D) \$4.80　(E) None of these

7. At a banquet, every 2 guests shared one dish for rice, every 3 guests shared one dish for soup and every 4 guests shared one dish for meat. How many guests were present if there were 65 dishes altogether?
(A)42　(B)56　(C)60
(D)120　(E)None of these

8. One hundred marbles are placed in three bowls. The first and second bowl contain a total of 56 marbles, and the second and third bowl a total of 70 marbles. How many marbles are in the third bowl?
(A)24　(B)30　(C)36
(D)44　(E)Not enough information

9. A class of 20 students achieves an average of 66 on an exam. A second class of 30 students achieves an average grade of 56 on the same exam. The average for the combined classes is:
(A)58　(B)59　(C)61
(D)62　(E)None of these

10. A circle of radius 2 rolls completely around the inside perimeter of a square of side 10. What distance is covered by the centre of the circle?



(A)16　(B)24
(C)32　(D)40
(E)None of these

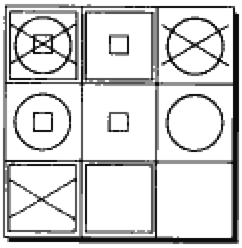
11. Define $a\times b$ to be the larger of $2a$ and $a+b$. Then $(2\times3)\times(3\times2)$ is equal to
(A)9　(B)10　(C)11
(D)12　(E)None of these

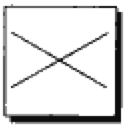
12. 当 A 和 B 为任何正整数时，下列哪一个数不能用 $11A+19B$ 表示？

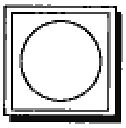
(A)30　　(B)68　　(C)123

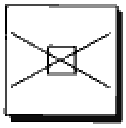
(D)211　　(E)上述答案都不对

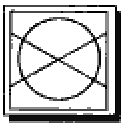
13. 正方形 A、B、C 和 D 中哪一个放置在右图空缺的位置比较合理？



(A) 

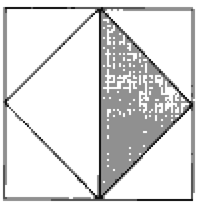
(B) 

(C) 

(D) 

(E)信息不足

14. 一正方形四边中点的连线构成另一内接小正方形。小正方形的阴影部分为原正方形的儿分之儿？



(A)$\frac{1}{8}$　　(B)$\frac{1}{6}$

(C)$\frac{1}{4}$　　(D)$\frac{1}{3}$

(E)$\frac{1}{2}$

15. 一俱乐部中的女性比男性多 16 人，女性人数的 7 倍比男性人数的 9 倍还多 32 人。问男性的人数是多少？

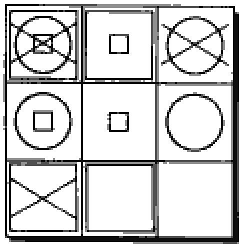
(A)4　　(B)24　　(C)32

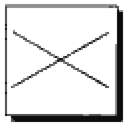
12. Of the following numbers, which cannot be expressed in the form $11A+19B$ where A and B are positive integers?

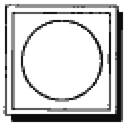
(A)30　　(B)68　　(C)123

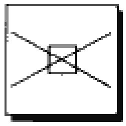
(D)211　　(E)None of these

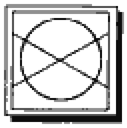
13. Which of the squares A, B, C or D should logically occupy the missing place in the figure below?



(A) 

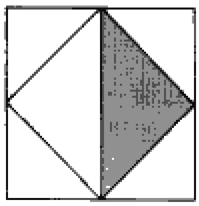
(B) 

(C) 

(D) 

(E)Not enough information

14. The midpoints of the sides of a square are joined together and part of the resulting square is shaded. The shaded area represents what proportion of the original square?



(A)$\frac{1}{8}$　　(B)$\frac{1}{6}$　　(C)$\frac{1}{4}$

(D)$\frac{1}{3}$　　(E)$\frac{1}{2}$

15. The women in a club outnumber the men by 16. 7 times the number of women exceeds 9 times the number of men by 32. Find the number of men.

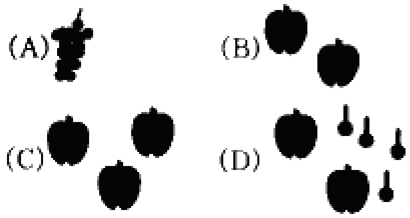
(A)4　　(B)24　　(C)32

(D)42　　(E)上述答案都不对

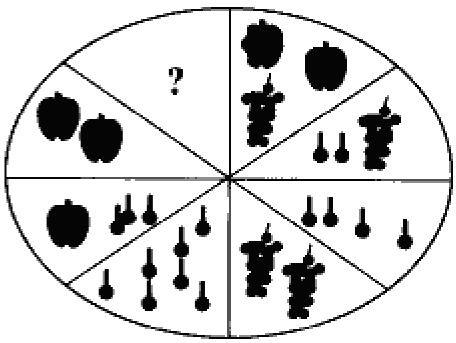
16. 如果前 100 个整数 $1+2+3+\cdots+99+100=5\ 050$,那么前 50 个奇数 $1+3+5+\cdots+99=?$

(A)2 500　　(B)2 524　　(C)2 525
(D)2 550　　(E)上述答案都不对

17. 苹果、樱桃和葡萄按下列方式放置在画板中:相对区域的水果的值相等。为与 2 串葡萄等值,在对应的空白区应放多少水果?



(E)信息不足



18. 通过前一位数字乘以 2 再加上 a 可得到一个序列。如果序列的第 6 位数量 70,第 9 位数量 609,那么 a 的值是多少?

(A)1　　(B)3　　(C)7
(D)49　　(E)上述答案都不对

19. 假定一球从任一高度落下都会反弹到一半高度。若一个球从 100 米高处落下,在它第 4 次着地时一共已运动了多少距离?

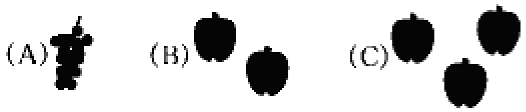
(A)137.5 米　　(B)187.5 米　　(C)275 米
(D)375 米　　(E)信息不足

(D)42　　(E)None of these

16. If the sum of the first 100 integers: $1+2+3+\cdots+99+100=5\ 050$, then the sum of the first 50 odd integers: $1+3+5+\cdots+99=?$

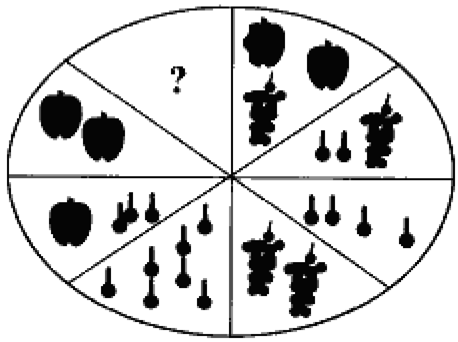
(A)2 500　　(B)2 524　　(C)2 525
(D)2 550　　(E)None of these

17. Apples, cherries and grapes are arranged on a platter in the following fashion: opposite sectors contain fruit which is of equal value. To equal the value of two bunches of grapes, how much fruit must be placed in the empty sector?





(E)Not enough information



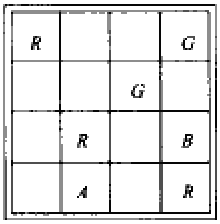
18. A sequence of numbers is obtained by multiplying each previous value by 2 and adding a number a to the result. If the 6th number is 70 and the 9th number is 609, what is the value of a?

(A)1　　(B)3　　(C)7
(D)49　　(E)None of these

19. Assume that a ball dropped from any height rises half the distance on the rebound. If a ball is dropped from 100 m, what distance will the ball have covered by the time it hits the ground the 4th time?

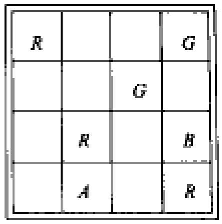
(A)137.5 m　　(B)187.5 m　　(C)275 m
(D)375 m　　(E)Not enough information

20. 一个矩形网络由红色和绿色两种颜色着色。在每行和每列中两种颜色各占一半。那么图中的 A 块和 B 块应着什么颜色?



(A) A = 红　B = 红
(B) A = 红　B = 绿
(C) A = 绿　B = 红　　(D) A = 绿　B = 绿
(E)信息不足

20. A rectangular grid is coloured with the two colours Red and Green so that each colour occurs half in each column and half in each row. What colours must the squares labelled A and B be coloured?



(A) $A = R$　$B = R$　　(B) $A = R$　$B = G$
(C) $A = G$　$B = R$　　(D) $A = G$　$B = G$
(E) Not enough information

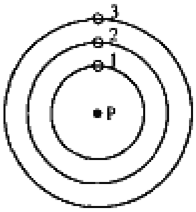
试 卷 二

Test 2

1. 递送包裹，某公司的收费起点是 1 美元，另外每千克加收 0.05 美元，每千米加收 0.01 美元。从蒙克敦到福得日克敦的距离是 180 千米，在两城市之间递送一 9 千克的包裹需要支付多少美元？
(A)1.45 美元　(B)2.25 美元　(C)3.25 美元
(D)18.45 美元　(E)上述答案都不对

2. 约翰每周的薪水是 300 美元。若每两周中有一周他能积存三分之一，另一周积存二分之一，需要多少周他才能积存 1 500 美元？
(A)5 周　(B)6 周　(C)10 周
(D)12 周　(E)15 周

3. 冥王星有 3 颗卫星。卫星一绕冥王星一周为 6 天，卫星二为 10 天，卫星三为 15 天。从图中所示的位置开始，需要多少天才能回复到原来的位置？



(A)30 天　(B)60 天　(C)90 天
(D)150 天　(E)900 天

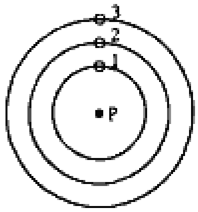
4. 在一地图上两个城镇的距离为 11 厘米。若地图的比例是 1 厘米＝25 千米，那么两城镇的距离是多少？
(A)44 千米　(B)50 千米　(C)225 千米
(D)275 千米　(E)2 525 千米

5. 水箱的容积是 4 000 升。200 升的水需要与 50 升除草剂混合以喷洒 1 公顷土地。若喷洒开始

1. To send a package, a company charges \$1 plus \$0.05 per kilogram and \$0.01 per kilometer. How much would you pay to send a 9 kilogram package from Moncton to Fredericton if the distance between those cities is 180 kilometers?
(A) \$1.45　(B) \$2.25　(C) \$3.25
(D) \$18.45　(E) None of these

2. John receives \$300 every week as a salary. If one week out of two weeks he keeps one third of it and the rest of the time he keeps one half of it, how many weeks will it take to save a total of \$1 500?
(A)5 weeks　(B)6 weeks　(C)10 weeks
(D)12 weeks　(E)15 weeks

3. The planet Pluto has 3 moons. Moon 1 takes 6 days to make a complete revolution around the planet, moon 2 takes 10 days and moon 3 takes 15 days. Starting from the position shown on the diagram, how many days are necessary to return to the original position?



(A)30 days　(B)60 days　(C)90 days
(D)150 days　(E)900 days

4. On a map, two towns are 11 centimeters apart. If the scale of the map is 1 cm = 25 km, how far apart are the towns?
(A)44 km　(B)50 km　(C)225 km
(D)275 km　(E)2 525 km

5. The capacity of a tank sprayer is 4 000 liters. If 200 liters of water is mixed with 50 liters of herbicide for

时水箱为 75% 充满，则可以喷洒多少公顷土地？

(A)12 (B)15 (C)16
(D)20 (E)上述答案都不对

each acre sprayed, how many acres can be sprayed if the tank is 75% full when the spraying begins?

(A)12 (B)15 (C)16
(D)20 (E)None of these

6. 241×376 的乘积还应加上多少才能是 9 的倍数？

(A)2 (B)3 (C)4
(D)5 (E)6

6. How much should we add to the product 241×376 to obtain a multiple of 9?

(A)2 (B)3 (C)4
(D)5 (E)6

7. 一个长方形的水池宽 8 米、长 12 米。水池周围绕有一均匀宽度的混凝土走道。水池和走道的总面积为 320 平方米，问走道的宽度是多少米？

(A)2 (B)4 (C)6
(D)8 (E)上述答案都不对

7. A rectangular pool is 8 m wide and 12 m long. A concrete walk of uniform width surrounds the pool. If the total area of the pool and the walk is 320 square meters, how many meters wide is the walk?

(A)2 (B)4 (C)6
(D)8 (E)None of these

8. 如果 1 英尺 = 12 英寸，那么可以在体积为 2 英尺×2 英尺×2 英尺的箱子中装多少体积为 6 英寸×4 英寸×8 英寸的盒子？

(A)8 (B)9 (C)54
(D)72 (E)上述答案都不对

8. If $1' = 12''$, determine the number of $6''\times 4''\times 8''$ rectangular boxes that can fit completely inside a $2'\times 2'\times 2'$ box.

(A)8 (B)9 (C)54
(D)72 (E)None of these

9. 下列有四个是相等的。挑出与其他不相等的数值。

(A)$\frac{1}{12}+\frac{2}{3}$ (B)$\frac{13}{20}+\frac{1}{10}$
(C)$\frac{5}{12}+\frac{1}{6}$ (D)$\frac{1}{4}+\frac{1}{2}$
(E)$\frac{11}{20}+\frac{1}{5}$

9. Four of the following are equal. Which is the odd one out?

(A)$\frac{1}{12}+\frac{2}{3}$ (B)$\frac{13}{20}+\frac{1}{10}$
(C)$\frac{5}{12}+\frac{1}{6}$ (D)$\frac{1}{4}+\frac{1}{2}$
(E)$\frac{11}{20}+\frac{1}{5}$

10. 一数学竞赛试卷有 19 道题目。答对了得 7 分，答错了扣 3 分。有一道试题被取消，即没有加分或扣分。如果丹尼尔的得分为 76 分，那么他答对了多少道试题？

(A)10 (B)11 (C)12
(D)13 (E)14

10. A mathematics contest consists of 19 questions. Seven points are awarded for each correct answer, and 3 points are deducted for each wrong answer. If a question is omitted, no points are awarded. If Daniel gets a score of 76 on the contest, how many questions did he answer correctly?

(A)10 (B)11 (C)12
(D)13 (E)14

11. 在 130 至 200 之间有一个三位数，它可以被 6 和 8 整除，它的十位数比个位数大。这个数是多少？

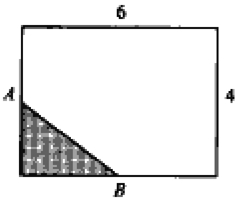
11. A three digit number is between 130 and 200. It is divisible by 6 and 8. The tens digit is greater than the ones digit. What is the number?

(A)144　　(B)168　　(C)184
(D)192　　(E)196

12. 一个水箱的一半被充满后是 48 升。若要充满到$\frac{2}{3}$水箱,还需要加多少升的水?

(A)16　　(B)18
(C)20　　(D)22
(E)24

13. 图中 A 和 B 分别是两边的中点。那么阴影部分为整个长方形的几分之几?



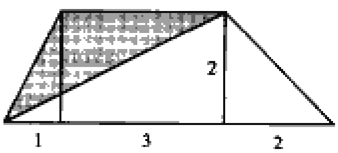
(A)$\frac{1}{16}$　　(B)$\frac{1}{8}$
(C)$\frac{1}{4}$　　(D)$\frac{1}{3}$
(E)上述答案都不对

14. 总长度为 9.1 米的墙体包括 10 个均匀隔开的正方形柱子(墙体两端均有柱子)。柱子边长为 10 厘米。问两相邻柱子间的距离是多少厘米?

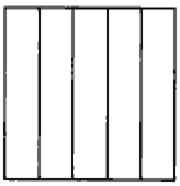
(A)81　　(B)90
(C)91　　(D)100
(E)上述答案都不对

15. 图中阴影部分的面积是多少?

(A)2　　(B)3　　(C)4
(D)5　　(E)6



16. 一正方形被划分成 5 个全等的长方形。若长方形的周长为 30 个单位,那么正方形的周长是多少?

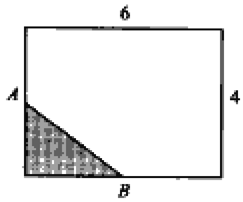


(A)144　　(B)168　　(C)184
(D)192　　(E)196

12. A water tank contains 48 liters when it is half full. How much water needs to be added so that it will be $\frac{2}{3}$ full?

(A)16　　(B)18
(C)20　　(D)22
(E)24

13. A and B are the middle points of the sides. What fraction (of the total area) does the shaded region represent?



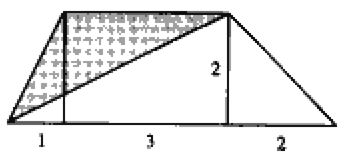
(A)$\frac{1}{16}$　　(B)$\frac{1}{8}$
(C)$\frac{1}{4}$　　(D)$\frac{1}{3}$
(E)None of these

14. A wall which is 9.1 meters long is divided by 10 evenly spaced 10 cm square posts (including the posts on the corners). How many cm wide is the space between consecutive posts?

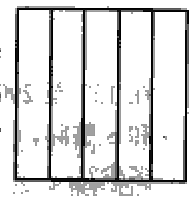
(A)81　　(B)90
(C)91　　(D)100
(E)None of these

15. What is the area of the shaded region?

(A)2　　(B)3　　(C)4
(D)5　　(E)6



16. The square is divided into 5 congruent rectangles. If the perimeter of one rectangle is 30 units, what is the perimeter of the square?



(A)50　　(B)60　　(C)150
(D)225　　(E)信息不足

17. 一个三角形的两边边长分别为 5 和 13。第三边边长的整数位可能有多少?
(A)1　　(B)9　　(C)10
(D)11　　(E)12

18. 有多少个三位数,它们各位上的数字和为 24?
(A)3　　(B)6　　(C)7
(D)10　　(E)18

19. 在北美使用的硬币面值有 0.01 美元、0.05 美元、0.10 美元、0.25 美元、1 美元和 2 美元,有多少方法可以获得 10 个硬币的总值为 3.15 美元?
(A)1　　(B)2　　(C)3
(D)4　　(E)不可能

20. 将小于 49 的正整数相乘。问这一乘积尾数有多少个零?
(A)5　　(B)9　　(C)10
(D)48　　(E)49

(A)50　　(B)60　　(C)150
(D)225　　(E)Not enough information

17. The lengths of two sides of a triangle are 5 and 13. How many integers are possible values for the length of the third side?
(A)1　　(B)9　　(C)10
(D)11　　(E)12

18. How many 3-digit numbers are there for which the sum of the digits of the number is 24?
(A)3　　(B)6　　(C)7
(D)10　　(E)18

19. In North America we use coins of the following denominations: $0.01, $0.05, $0.10, $0.25, $1 and $2. In how many ways can we obtain a sum of $3.15 using exactly 10 coins?
(A)1　　(B)2　　(C)3
(D)4　　(E)It is not possible

20. All the positive integers less than 49 are multiplied together. How many zeros will this product end in?
(A)5　　(B)9　　(C)10
(D)48　　(E)49

试　卷　三

Test　3

1. 一时钟在下午 1 点校准，它每小时慢 3 分钟。在次日上午正 10 点时，这一时钟的读数是多少？
(A)8:57　(B)9:03
(C)10:00　(D)11:03
(E)上述答案都不对

2. 在一锦标赛中每一队将与另外各队相遇 2 次。锦标赛一共有 30 场比赛。问一共有多少代表队参加了比赛？
(A)4　(B)5　(C)6
(D)7　(E)15

3. 一个乐队有 30 个音乐家。其中 12 位能演奏长笛，有 12 位能演奏小号，有 6 位既能演奏长笛又能演奏小号。问有多少音乐家既不能演奏长笛又不能演奏小号？
(A)0　(B)6　(C)12
(D)15　(E)上述答案都不对

4. 有多少个整数 n 值可以满足$\frac{5}{61}<\frac{1}{n}<\frac{13}{57}$？
(A)1　(B)6　(C)7　(D)8　(E)9

5. 在棒球比赛中，选手的击球平均数可以用击到球的次数除以轮到击球的次数计算。一选手在轮到 400 次击球次数中击到球 100 次。若到本赛季结束他还有 200 次击球次数，要使击球平均数达 0.300，他需要击到球多少次？
(A)60　(B)80　(C)120
(D)180　(E)上述答案都不对

1. A clock is set correctly at 1:00 p.m.. It loses 3 minutes during every hour. What will the clock read when the correct time is 10:00 a.m. the next day?
(A)8:57　(B)9:03
(C)10:00　(D)11:03
(E)None of these

2. In a tournament where each team meets every other team twice, a total of 30 games are played. How many teams play in this tournament?
(A)4　(B)5　(C)6
(D)7　(E)15

3. An orchestra has 30 musicians. Twelve of them can play the flute and twelve of them can play the trumpet. Six of them can play both. How many of the musicians can not play either of these instruments?
(A)0　(B)6　(C)12
(D)15　(E)None of these

4. How many integers n are there such that $\frac{5}{61}<\frac{1}{n}<\frac{13}{57}$?
(A)1　(B)6　(C)7　(D)8　(E)9

5. In the game of baseball, a player's batting average is obtained by dividing the number of hits by the number of times at bat. A player has already had 100 hits in 400 times at bat. If he still has 200 more times at bat until the end of the season, how many more hits does he need in order to end the season with a batting average of 0.300?
(A)60　(B)80　(C)120
(D)180　(E)None of these

6. 保罗比罗玛小 5 岁,朱尔斯比保罗和罗玛岁数的总和小 10 岁。若三个人的岁数总和是 80 岁,罗玛是多少岁?

(A)20 (B)25 (C)30
(D)35 (E)40

7. 光速为每秒 300 000 千米。行星冥王星与地球的距离为 60 亿千米。若宇宙飞船按恒速直线飞行从地球到冥王星需 100 小时,则飞船的速度是光速的几分之几?

(A)$\frac{6}{100}$ (B)$\frac{1}{18}$ (C)$\frac{1}{180}$
(D)$\frac{1}{1\ 080}$ (E)上述答案都不对

8. $\sqrt{\frac{1\ 997}{10\ 000}}$最接近下列哪一个数值?

(A)0.004 4 (B)0.014 1 (C)0.044 6
(D)0.141 1 (E)0.446 9

9. 下列序列中的缺项是哪一个数?

1 2 5 12 ? 58

(A)24 (B)27 (C)28
(D)33 (E)上述答案都不对

10. $2^1 \times 3^2 \times 4^3 \times 5^4$ 的积是几位数?

(A)5 (B)6 (C)7
(D)8 (E)上述答案都不对

11. 若定义 $a \times b = a^2 + \frac{1}{b}$,计算 3×5 的值。

(A)$\frac{9}{5}$ (B)$\frac{46}{5}$ (C)15
(D)$\frac{76}{3}$ (E)上述答案都不对

12. 一农夫在一块长方形的土地上按排栽种树。若每排栽种的树是排数的 3 倍,并且一共栽种了 972 棵树,问每排有多少棵树?

6. Paul is 5 years younger than Roman and Jules is 10 years younger than the sum of Paul's and Roman's ages. How old is Roman if the three ages add up to 80 years?

(A)20 (B)25 (C)30
(D)35 (E)40

7. The speed of light is 300 000 km/sec and the planet Pluto is located at a distance of 6 billion km from Earth. If a spaceship, traveling at a constant speed in a straight line, goes from Earth to Pluto in 100 hours, at what fraction of the speed of light is this spaceship traveling?

(A)$\frac{6}{100}$ (B)$\frac{1}{18}$ (C)$\frac{1}{180}$
(D)$\frac{1}{1\ 080}$ (E)None of these

8. Of the following, which is the closest estimate of $\sqrt{\frac{1\ 997}{10\ 000}}$?

(A)0.004 4 (B)0.014 1 (C)0.044 6
(D)0.141 1 (E)0.446 9

9. Find the missing term in the sequence:

1 2 5 12 ? 58

(A)24 (B)27 (C)28
(D)33 (E)None of these

10. How many digits does the number $2^1 \times 3^2 \times 4^3 \times 5^4$ have?

(A)5 (B)6 (C)7
(D)8 (E)None of these

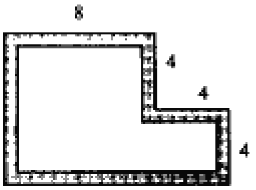
11. If $a \times b = a^2 + \frac{1}{b}$, find the value of 3×5.

(A)$\frac{9}{5}$ (B)$\frac{46}{5}$ (C)15
(D)$\frac{76}{3}$ (E)None of these

12. A farmer plants trees in rows in a rectangular field. If each row has three times as many trees as there are rows and if there are 972 trees in the field, how many trees are there in each row?

(A)18　　(B)27　　(C)36
(D)54　　(E)上述答案都不对

13. 若图中阴影部分的宽度恒定为 1 个单位,则非阴影部分的面积与阴影部分的面积的差值是多少?



(A)0　　(B)4
(C)8　　(D)12
(E)上述答案都不对

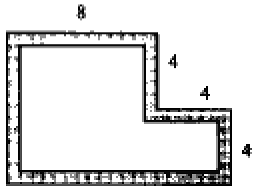
14. 一个水果店苹果的售价为每个 5 美分,橘子的售价为每个 10 美分,香蕉的售价为每个 25 美分。如果你在水果店花费了 55 美分仅购买两种水果,问有多少不同的选择?
(A)7　　(B)8　　(C)9
(D)14　　(E)18

15. 你销售 A 和 B 两种电视游戏。第一天你销售出 3 个 A 种游戏、5 个 B 种游戏,总收入为 450 美元。第二天你将 A 种游戏减价 20 美元、将 B 种游戏提价 10 美元。这一天你销售出 5 个 A 种游戏、4 个 B 种游戏,总收入为 430 美元。问第二天 A 种游戏的售价是多少?
(A)30 美元　　(B)40 美元
(C)50 美元　　(D)60 美元
(E)70 美元

16. 一行走道的运动速度为 4 千米/小时。一步行者按 6 千米/小时速度在行走道上按走道同方向行走 1 千米,然后再向反方向行走回到起点。问步行者这一个来回花了多少时间?
(A)10 分钟　　(B)20 分钟
(C)30 分钟　　(D)36 分钟
(E)上述答案都不对

(A)18　　(B)27　　(C)36
(D)54　　(E)None of these

13. If the shaded region has a constant width of 1 unit, what is the difference between the areas of the non-shaded region and the shaded region?



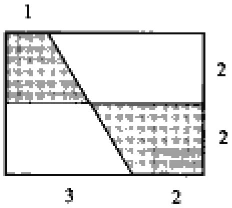
(A)0　　(B)4　　(C)8
(D)12　　(E)None of these

14. A fruit shop sells apples for 5 cents each, oranges for 10 cents each and bananas for 25 cents each. If you spend exactly 55 cents at the shop, how many distinct purchases of exactly two kinds of fruit can you make?
(A)7　　(B)8　　(C)9
(D)14　　(E)18

15. You are selling video games of two types, A and B. The first day, you sell 3 games of type A and 5 games of type B for a total of \$450. The second day, you decrease the price of type A games by \$20 and you increase the price of type B games by \$10. You then sell 5 games of type A and 4 games of type B for a total of \$430. What was the price of the type A games on the second day?
(A) \$30　　(B) \$40
(C) \$50　　(D) \$60
(E) \$70

16. A moving sidewalk travels at 4 km/h. A pedestrian walking at 6 km/h covers 1 km on the sidewalk going in the same direction as the sidewalk and then comes back to the starting point walking in the opposite direction from the movement of the sidewalk. How long does the round trip take?
(A)10 min　　(B)20 min
(C)30 min　　(D)36 min
(E)None of these

17. 阴影部分的面积是多少？



(A)6
(B)8
(C)10
(D)12
(E)信息不足

18. 指数 $2^{1\,997}$的最后一位数是多少？

(A)0 (B)2 (C)4
(D)6 (E)8

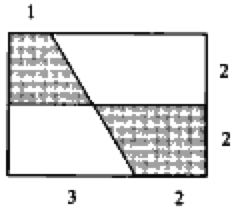
19. 可用三根管向容器中注入液体，采用第一根管注满容器的时间为 10 小时。采用第二根管和第三根管注满容器的时间分别为 12 小时和 15 小时。由于压力问题使每根管的输入能力仅为原来的一半。因此决定用三根管同时向容器中注入液体，问这时注满空容器需要多长时间？

(A)4 小时 (B)5 小时 (C)8 小时
(D)12 小时 (E)上述答案都不对

20. 包括 1 至 1 000 之间的整数中有多少个不含数字 8 或 9？

(A)200 (B)488 (C)512
(D)521 (E)800

17. What is the area of the shaded region?



(A)6
(B)8
(C)10
(D)12
(E)Not enough information

18. What is the last digit of the number $2^{1\,997}$?

(A)0 (B)2 (C)4
(D)6 (E)8

19. Three pipes can be used to fill a tank. It is filled in 10 hours using only the first pipe, in 12 hours using only the second pipe and in 15 hours using only the third one. A pressure problem cuts the flow capacity of each pipe in half. It is then decided to use the three pipes together. How long will it take to fill the tank?

(A)4 hr (B)5 hr (C)8 hr
(D)12 hr (E)None of these

20. How many integers between 1 and 1 000 (inclusive) do not contain the digits 8 or 9?

(A)200 (B)488 (C)512
(D)521 (E)800

试 卷 四

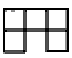
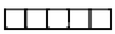
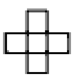
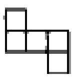
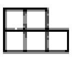
Test 4

1. 从下午 10 点 52 分到次日凌晨 1 点 48 分一共有多少分钟?
   (A)124 (B)176 (C)270
   (D)904 (E)1 200

2. $2\frac{1}{2}$的平方等于多少?
   (A)4.25 (B)5.00
   (C)5.50 (D)6.25
   (E)上述答案都不对

3. 衬衫专卖店在上午的售价为每件 5 美元,上午的总收入为 300 美元。下午衬衫的售价降到每件 4 美元,并且销售量是上午的 2 倍。这一天的总收入是多少?
   (A)540 美元 (B)580 美元 (C)780 美元
   (D)840 美元 (E)1 080 美元

4. 一汽车以 40 千米/小时的平均速度用 $1\frac{1}{2}$小时行驶了一段距离。若汽车的平均速度为 60 千米/小时,则行驶同样一段距离需多长时间?
   (A)$\frac{2}{3}$小时 (B)$\frac{3}{4}$小时 (C)1 小时
   (D)$2\frac{1}{4}$小时 (E)3 小时

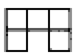
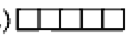
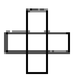
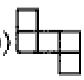
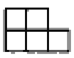
5. 由 5 个边长为 1 厘米的方块组成下列各图形。问哪个图形的周长最短?
   (A) (B)
   (C) (D)
   (E)

1. The number of minutes from 10:52 p.m. until 1:48 a.m. on the next day is
   (A)124 (B)176 (C)270
   (D)904 (E)1 200

2. The square of $2\frac{1}{2}$ is
   (A)4.25 (B)5.00
   (C)5.50 (D)6.25
   (E)None of these

3. The Shirt Shoppe sells shirts for \$5 each during the morning hours. Their sales of the shirts for the morning total \$300. At noon, the price for each shirt is lowered to \$4 and the Shoppe sells twice as many. The total slaes for the day is
   (A) \$540 (B) \$580 (C) \$780
   (D) \$840 (E) \$1 080

4. At an average speed of 40 km/hr a car take $1\frac{1}{2}$ hours to travel a certain distance. How long will it take to travel the same distance at 60 km/hr?
   (A)2/3hr (B)3/4 hr (C)1 hr
   (D)$2\frac{1}{4}$ hr (E)3 hr

5. Using 5 squares each of which has sides of length 1 cm, the following figures can be made. Which of these has the smallest perimeter?
   (A) (B)
   (C) (D)
   (E)

6. A、B、C 三人每人每天服 2 片维生素片。D 一人每天只服 1 片。一瓶药够四人服用 24 天。若 D 一人每天改服 2 片，则这一瓶药够四人服用多少天？

(A)16 (B)18 (C)20

(D)21 (E)22

7. 在 100 场比赛后若迈克尔·乔丹的每场平均得分为 29 分，在余下的 50 场比赛中他需要得多少分，才能使整个赛季的每场平均得分为 30 分？

(A)1 000 (B)1 500

(C)1 600 (D)3 000

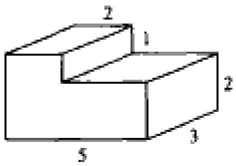
(E)上述答案都不对

8. 立体图形的体积是多少？

(A)12 (B)30

(C)35 (D)36

(E)40



9. 五个商家以不同的价格销售葡萄。哪一家最便宜？

(A)1 美元买 2.5 千克 (B)2.3 美元买 5 千克

(C)0.44 美元买 1 千克

(D)4.20 美元买 10 千克

(E)3.10 美元买 7.5 千克

10. 计算

$$\frac{\frac{1}{2}\times\frac{1}{3}\times\frac{6}{2}\times\frac{4}{3}\times\frac{2}{1}\times\frac{3}{2}\times\frac{4}{3}\times\frac{3}{4}\times\frac{4}{5}\times\frac{5}{6}}{\frac{2}{3}\times\frac{4}{6}\times\frac{6}{2}\times\frac{2}{3}\times\frac{3}{6}\times\frac{2}{3}\times\frac{4}{3}}+1$$

的值。

(A)$\frac{8}{35}$ (B)$\frac{35}{27}$ (C)$\frac{2}{3}$

(D)$\frac{35}{8}$ (E)上述答案都不对

11. A、B、C、D 和 E 是 5 个相邻的整数。如果 $B+C+D=63$，那么 $A+B+C+D+E$ 等于多少？

(A)70 (B)84 (C)105

(D)120 (E)信息不足

6. Persons A, B and C each take 2 vitamin tablets a day while person D takes only 1 tablet a day. A full bottle of tablets lasts 24 days for all 4 of them. How many days will a full bottle last if D also takes 2 tablets a day?

(A)16 (B)18 (C)20

(D)21 (E)22

7. If Michael Jordan has an average of 29 points per game after 100 games, how many points does he need in the remaining 50 games so that he finishes the season with an average of 30 points per game?

(A)1 000 (B)1 500

(C)1 600 (D)3 000

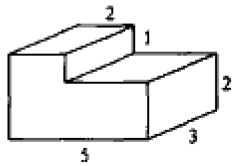
(E)None of these

8. The volume of the solid figure shown is

(A)12 (B)30

(C)35 (D)36

(E)40



9. Five merchants sell grapes at different prices. Which is the best buy?

(A)2.5 kg for \$1 (B)5 kg for \$2.30

(C)1 kg for \$0.44 (D)10 kg for \$4.20

(E)7.5 kg for \$3.10

10. Evaluate the following expression:

$$\frac{\frac{1}{2}\times\frac{1}{3}\times\frac{6}{2}\times\frac{4}{3}\times\frac{2}{1}\times\frac{3}{2}\times\frac{4}{3}\times\frac{3}{4}\times\frac{4}{5}\times\frac{5}{6}}{\frac{2}{3}\times\frac{4}{6}\times\frac{6}{2}\times\frac{2}{3}\times\frac{3}{6}\times\frac{2}{3}\times\frac{4}{3}}+1$$

(A)$\frac{8}{35}$ (B)$\frac{35}{27}$ (C)$\frac{2}{3}$

(D)$\frac{35}{8}$ (E)None of these

11. A,B,C,D,E are 5 consecutive integers. If $B+C+D=63$, then $A+B+C+D+E$ equals

(A)70 (B)84 (C)105

(D)120 (E)Not enough information

12. 如果 y 是一个正数,并且 $x=-y$,问下列哪一项是错误的?

(A)$x^2y>0$ (B)$x+y=0$ (C)$xy<0$

(D)$\frac{1}{x}-\frac{1}{y}=0$ (E)$1+\frac{x}{y}=0$

13. 汽车的耗油率常常表示为行驶 100 千米所需汽油的升数。若一汽车行驶 12.5 千米需汽油 1 升,问汽车的耗油率是多少?

(A)5 (B)7 (C)8

(D)10 (E)12.5

14. 在 3 棵树上栖息着 15 只蓝樫鸟和 14 只金莺。每棵树上至少有 4 只蓝樫鸟和 2 只金莺。如果每棵树上的金莺都不会比蓝樫鸟多,那么一棵树上最多有多少只鸟?

(A)11 (B)12 (C)13

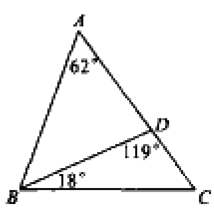
(D)14 (E)15

15. $\angle ABD$ 是多少度?

(A)47° (B)57°

(C)80° (D)110°

(E)137°



16. 一球反弹的距离为其落下高度的 2/3。若第二次反弹距离为 72 厘米,球最初的落下高度是多少?

(A)32 (B)48 (C)108

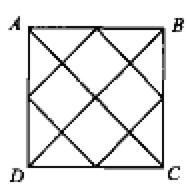
(D)162 (E)上述答案都不对

17. $ABCD$ 为一正方形。这一正方形中有多少个三角形?

(A)8 (B)12

(C)16 (D)20

(E)上述答案都不对



12. If y is a positive number and $x=-y$, which one of the following is false?

(A)$x^2y>0$ (B)$x+y=0$ (C)$xy<0$

(D)$\frac{1}{x}-\frac{1}{y}=0$ (E)$1+\frac{x}{y}=0$

13. The fuel consumption rate of automobiles is usually given as the number of litres of gasoline required to travel 100 km. If an automobile can travel 12.5 km on one litre of gas, the consumption rate for the automobile is

(A)5 (B)7 (C)8

(D)10 (E)12.5

14. There are 15 Blue Jays and 14 Orioles perched in 3 trees. Each tree has at least 4 Blue Jays and 2 Orioles. If no tree has more Orioles than Blue Jays, then the largest number of birds that can be in one tree is

(A)11 (B)12 (C)13

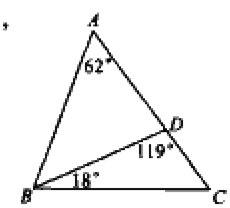
(D)14 (E)15

15. The angle ABD, in degrees, is

(A)47° (B)57°

(C)80° (D)110°

(E)137°



16. A ball bounces 2/3 of the distance through which it falls. If the second rebound is 72 cm, the height, in cm, through which the ball originally dropped is

(A)32 (B)48 (C)108

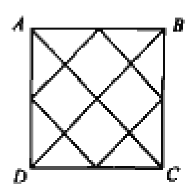
(D)162 (E)None of these

17. $ABCD$ is a square. The number of triangles in the diagram is

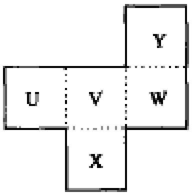
(A)8 (B)12

(C)16 (D)20

(E)None of these



18. 按图中的虚线对折可做成一顶部敞开的盒子。问哪一个字母在底面上？



(A)U　　(B)V
(C)W　　(D)X
(E)Y

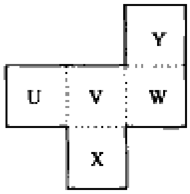
19. 马丁先生买了 2 个球，又以每个 1.20 美元售出。与购买价相比，1 个球长了 20% 的价，一个球落了 20% 的价。这一买卖的结果是什么？

(A)没有净利润　　(B)损失 4 美分
(C)获利 4 美分　　(D)损失 10 美分
(E)获利 10 美分

20. 高度为 300 米时飞机的水平速度为 200 千米/小时，并且有一定的垂直向上的速度。为避开 1 千米以外一座高 500 米的山，飞机的最小垂直向上的速度应该是多少千米/小时？

(A)30　　(B)40　　(C)100
(D)120　　(E)上述答案都不对

18. The sheet shown is folded along the dotted lines to form an open box with the opening on top. Which letter is on the bottom?



(A)U　　(B)V
(C)W　　(D)X
(E)Y

19. Mr. Martin bought two balls which he then resold at $1.20 each. Based on the cost of the balls (the price he payed), Mr. Martin made a profit of 20% on one of the balls and encountered a loss of 20% on the other. Overall, both sales have led to

(A)no net profit　　(B)a loss of 4 cents
(C)a profit of 4 cents　　(D)a loss of 10 cents
(E)a profit of 10 cents

20. At the moment when its altitude is 300 m, a plane is flying with a horizontal speed of 200 km/hr and an unknown vertical speed. What is the minimum average vertical speed, in km/hr, required to avoid a 500 m tall mountain situated at a horizontal distance of 1 km away from the plane?

(A)30　　(B)40　　(C)100
(D)200　　(E)None of these

试 卷 五

Test 5

1. 当 5 个女生新加入到某一班级后，女生人数从 40%增至 50%。问班上的男生有多少？
(A)5 (B)10 (C)12
(D)15 (E)上述答案都不对

1. When 5 new girls joined a class the percentage of girl students increased from 40% to 50%. The number of boys in the class is given by
(A)5 (B)10 (C)12
(D)15 (E)None of these

2. 一行星自转一周的时间是地球自转一周时间的三分之一。这一行星的多少天相当于地球的一星期？
(A)$\frac{7}{3}$ (B)7 (C)10
(D)21 (E)上述答案都不对

2. A planet takes a third of the time required for the earth to complete one revolution about its axis. How many days will there be on this planet during one week on earth?
(A)$\frac{7}{3}$ (B)7 (C)10
(D)21 (E)None of these

3. 在一个 6 人组中，有 2 个人的质量为 60 千克，另 3 人的质量是 60 千克的 1.5 倍。要使全组的人均质量为 70 千克，最后 1 个人的质量应是多少千克？
(A)30 (B)65 (C)70
(D)80 (E)上述答案都不对

3. In a group of six people, two have a mass of 60 kg while three have a mass one and a half times that. What is the mass of the sixth person if the average group mass is 70 kg?
(A)30 (B)65 (C)70
(D)80 (E)None of these

4. 在袋子 A 中有 x 个 0.1 美元硬币、y 个 0.05 美元硬币，在袋子 B 中有 x 个 0.05 美元硬币、y 个 0.1 美元硬币。两个袋子中硬币的总面值相同。两个袋子中硬币个数的总和不可能是下列哪个数？
(A)30 (B)40 (C)60
(D)80 (E)100

4. There are x dimes and y nickels in bag A and x nickels and y dimes in bag B. The total value of the coins is the same for both bags. The combined number of coins in the 2 bags cannot be
(A)30 (B)40 (C)60
(D)80 (E)100

5. 一台电视机降价最终按 200 美元销售。如果第一次降价 20%、第二次降价 10%，那么电视机的原价是多少？
(A)$\frac{200}{0.8}$美元 (B)$\frac{200}{0.72}$美元 (C)$\frac{200}{0.7}$美元
(D)200×0.3 美元 (E)上述答案都不对

5. A television set is on sale at a reduced price of \$200. What was the initial price of the television if the initial price was first reduced by 20% and then the second price was itself reduced by 10%?
(A) $\$\frac{200}{0.8}$ (B) $\$\frac{200}{0.72}$ (C) $\$\frac{200}{0.7}$
(D) $\$200\times0.3$ (E)None of these

6. 序列 19,82,37,64,55,……的下一项是多少?

(A)44 (B)46 (C)55

(D)56 (E)64

7. 下列哪一项的值最大?

(A)1 (B)$\dfrac{1}{\frac{1}{2}+\frac{1}{3}}$ (C)$\left(1+\frac{1}{10}\right)^3$

(D)$\dfrac{1+\frac{1}{6}}{1-\frac{1}{6}}$ (E)$\left(1-\frac{1}{10}\right)^3$

8. 一湖面上整夜都有降雨。降雨量为每平方米 50 升。问湖的水位会长多高?

(A)0.05 米 (B)0.5 米 (C)5 米

(D)50 米 (E)以上答案都不对

9. 如果我们的一天按 10 个小时计,每个小时为 100 分钟,每分钟为 100 秒,那么下午 6 点对应什么时间?

(A)6:00 (B)6:48 (C)7:00

(D)9:00 (E)上述答案都不对

10. 一列 300 米长的火车按 100 千米/小时的速度行驶。问火车需要多少秒能超过同方向按 10 千米/小时的速度跑步的人?

(A)9.8 (B)10.8 (C)12

(D)15 (E)上述答案都不对

11. 如果 $a\times b=\frac{a}{b}+\frac{b}{a}$,计算$(1\times2)\times3$的值。

(A)$\frac{1}{2}$ (B)$\frac{13}{6}$ (C)$\frac{5}{2}$

(D)$\frac{61}{30}$ (E)6

12. 以色列、巴勒斯坦、俄罗斯和美国共派了 15 名代表参加会议。各国派出的代表人数都不一样(每国至少派 1 名)。以色列和俄罗斯代表总人数为6人,俄罗斯和美国代表总人数为7人。

6. What is the next term in the sequence 19,82,37, 64,55,…?

(A)44 (B)46 (C)55

(D)56 (E)64

7. Which of the following expressions is the largest?

(A)1 (B)$\dfrac{1}{\frac{1}{2}+\frac{1}{3}}$ (C)$\left(1+\frac{1}{10}\right)^3$

(D)$\dfrac{1+\frac{1}{6}}{1-\frac{1}{6}}$ (E)$\left(1-\frac{1}{10}\right)^3$

8. Rain falls all night over a lake. The total rainfall is 50 litres per square meter. By how much does the surface of the lake rise?

(A)0.05 m (B)0.5 m (C)5 m

(D)50 m (E)None of these

9. If our days were divided into 10 hours (with no need for a. m. and p. m.), the new hours into 100 minutes and the new minutes into 100 seconds, what new time would it be at 6 p.m.?

(A)6:00 (B)6:48 (C)7:00

(D)9:00 (E)None of these

10. How many seconds will it take for a train 300 meters long travelling at 100 km/hr to pass a man jogging at 10 km/hr in the same direction?

(A)9.8 (B)10.8 (C)12

(D)15 (E)None of these

11. If $a\times b=\frac{a}{b}+\frac{b}{a}$, find the value of $(1\times2)\times3$.

(A)$\frac{1}{2}$ (B)$\frac{13}{6}$ (C)$\frac{5}{2}$

(D)$\frac{61}{30}$ (E)6

12. A total of fifteen delegates from Israel, Palestine, Russia and the United States meet at a conference. Each of these countries has sent a different number of delegates (with each country sending at least one

有一个国家派出了4名代表,问是哪一个国家?

(A)俄罗斯　(B)巴勒斯坦　(C)美国

(D)以色列　(E)信息不足

delegate). Israel and Russia have sent a combined total of six delegates. Russia and the United States have sent a combined total of seven. One country has sent four delegates. Which one was it?

(A)Russia　(B)Palestine　(C)United States

(D)Israel　(E)Not enough information

13. 序列 2, 14, ?, 686, 4 802, … 中的缺项是多少?

(A)16　(B)28　(C)98

(D)100　(E)上述答案都不对

13. Find the missing term in the following sequence of numbers: 2, 14, ?, 686, 4 802, …

(A)16　(B)28　(C)98

(D)100　(E)None of these

14. A、B 和 C 代表三个数。如果 $C-2A=50$、$B+3A=10$,那么三个数的平均值是多少?

(A)20　(B)30　(C)40

(D)50　(E)信息不足

14. A, B and C are three numbers. If $C-2A=50$ and $B+3A=10$, then the average of the three numbers is

(A)20　(B)30　(C)40

(D)50　(E)Not enough information

15. 一只蜂鸟每秒钟拍动翅膀60次。在一周内蜂鸟可拍动翅膀多少次?

(A)96 000　(B)216 000

(C)5 184 000　(D)36 288 000

(E)上述答案都不对

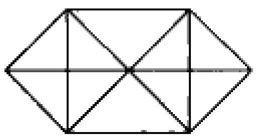
15. A hummingbird beats its wings 60 times per second. How many times does it beat its wings in one week?

(A)96 000　(B)216 000

(C)5 184 000　(D)36 288 000

(E)None of these

16. 右边的图形中有多少个三角形?

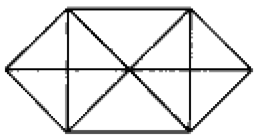


(A)10　(B)14

(C)18　(D)22

(E)上述答案都不对

16. How many triangles are there in the figure shown at the right?



(A)10　(B)14

(C)18　(D)22

(E)None of these

17. 计算 $1+3-5-7+9+11-13-15+17+\cdots-79+81$ 的和?

(A) -1　(B)1　(C)80

(D)82　(E)上述答案都不对

17. What is the value of the sum

$1+3-5-7+9+11-13-15+17+\cdots-79+81$?

(A) -1　(B)1　(C)80

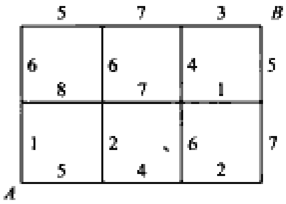
(D)82　(E)None of these

18. 一立方体的表面分别用数字1、2、3、4、5和6标记。立方体的角用"角顶数"表示,即角顶数为与角相遇的3个面上数字的和。问角顶数的和是多少?

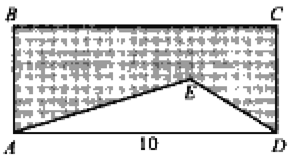
18. The faces of a cube are marked with the numbers 1, 2, 3, 4, 5, 6. Each corner of the cube is assigned "vertex number" equal to the sum of all the numbers on the faces that meet at this corner. The sum of all the vertex numbers is

(A)21　　(B)42　　(C)63
(D)84　　(E)上述答案都不对

19. 地图上显示了走过每一段道路所需的费用。问从 A 点到达 B 点的最低费用是多少?
(A)17　　(B)18　　(C)19
(D)20　　(E)21

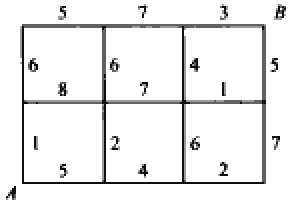


20. 如图所示,长方形 $ABCD$ 的宽度为 10 厘米、高度为 8 厘米,$\triangle ADE$ 的高为 4 厘米。问图中阴影部分的面积是多少平方厘米?
(A)20　　(B)40　　(C)60
(D)80　　(E)100

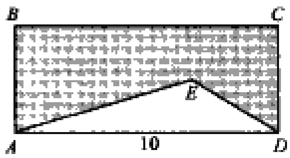


(A)21　　(B)42　　(C)63
(D)84　　(E)None of these

19. The map shows the cost of travelling through each section of road. What is the lowest possible cost for going from point A to point B?
(A)17　　(B)18　　(C)19
(D)20　　(E)21



20. In the diagram, the rectangle $ABCD$ has a width of 10 cm and a height of 8 cm. The height of the triangle ADE is 4 cm. The shaded area, in cm^2, is
(A)20　　(B)40　　(C)60
(D)80　　(E)100



试　卷　六

Test 6

1. $9\times8\times7\times6\times5\times4\times3\times2\times1$ 的乘积的最后一位数是多少?
(A)0　(B)2　(C)4
(D)6　(E)8

2. 一个国家有135百万人口和15万平方千米的土地。按每平方千米多少人口表示的人口密度是多少?
(A)0.09　(B)0.9　(C)9
(D)90　(E)900

3. 展销时一本书减价25%,这一新的价格又被减少了40%。问这一本书的实际售价是原价的百分之几?
(A)35%　(B)37.5%　(C)45%
(D)55%　(E)上述答案都不对

4. 下列哪一个表达式的数值最大?
(A)$(2^2)^5$　(B)$(2.5)^2$　(C)$\frac{2}{\left(\frac{1}{10}\right)}$
(D)$(5^2)(2^5)$　(E)$(5^2)^2$

5. 在一批60个苹果中,有$\frac{1}{4}$的苹果太小,有$\frac{1}{3}$的苹果不熟,有$\frac{1}{10}$的苹果已有腐烂。若苹果至多仅有上述的一种缺陷,问有多少个好苹果?
(A)18　(B)24　(C)27
(D)30　(E)上述答案都不对

6. 史蒂夫要租一辆车。一租车公司每天收费20.25

1. What is the last digit in the product $9\times8\times7\times6\times5\times4\times3\times2\times1$?
(A)0　(B)2　(C)4
(D)6　(E)8

2. A country with 135 million persons has an area of 150 000 square kilometres. The population density expressed in the number of persons per square kilometre is
(A)0.09　(B)0.9　(C)9
(D)90　(E)900

3. During a sale, the price of a book is reduced by 25%. The new price is then further reduced by 40%. The cost of the book as a percentage of the original price is
(A)35%　(B)37.5%　(C)45%
(D)55%　(E)None of these

4. Which of the following expressions has the greatest value?
(A)$(2^2)^5$　(B)$(2.5)^2$　(C)$\frac{2}{\left(\frac{1}{10}\right)}$
(D)$(5^2)(2^5)$　(E)$(5^2)^2$

5. In a lot of 60 apples, 1/4 of the apples are too small, 1/3 are not ripe and 1/10 are rotten. If no apple has two or more of these defects, how many perfect apples are there?
(A)18　(B)24　(C)27
(D)30　(E)None of these

6. Steve wants to rent a car. A rental company

美元,另外每千米加收 14 美分。另一租车公司每天收费 18.25 美元,另外每千米加收 16 美分。史蒂夫的行驶里程是多少才能使两公司的租车费用相等?

(A)100　　(B)200　　(C)250
(D)400　　(E)上述答案都不对

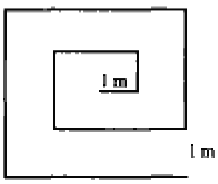
7. 序列 4,5,8,13,20,29,…的下一项是多少?

(A)38　　(B)39　　(C)40
(D)42　　(E)49

8. 一汽车以 100 千米/小时的速度行驶 10 千米,以 80 千米/小时的速度行驶 40 千米,以 50 千米/小时的速度再行驶一段距离。如果整个行程的平均速度为 70 千米/小时,问第三段的行驶距离是多少?

(A)10 千米　　(B)20 千米　　(C)30 千米
(D)40 千米　　(E)上述答案都不对

9. 如右图所示,1 米宽的路径由栅栏围绕。问栅栏的长度是多少?



(A)20 米　　(B)21 米
(C)22 米　　(D)23 米
(E)24 米

10. $\frac{a}{b}$是一分数。若分子加上 2,分数的值为$\frac{1}{2}$。若分母加上 3,分数的值为$\frac{1}{3}$。问 $a+b$ 的值是多少?

(A)18　　(B)19　　(C)20
(D)22　　(E)25

11. 每天莉莎将她的零钱(5 美分和 10 美分硬币)放入储蓄罐中。这个周末她决定数一下储蓄金。她有 72 个硬币,总面值为 4.95 美元。问有多少个 10 美分硬币?

(A)14　　(B)23　　(C)25
(D)27　　(E)上述答案都不对

charges \$20.25 per day plus 14 cents per kilometre. Another rental company charges \$18.25 per day plus 16 cents per kilometre. How many kilometres does Steve have to travel in order for the rental costs from both companies to be the same?

(A)100　　(B)200　　(C)250
(D)400　　(E)None of these

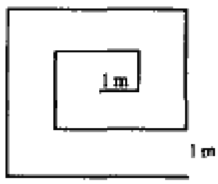
7. The next number in the sequence 4,5,8,13,20, 29,… is

(A)38　　(B)39　　(C)40
(D)42　　(E)49

8. An automobile travels 10 km at a speed of 100 kph, 40 km at 80 kph and a third distance at 50 kph. If the average velocity for the trip is 70 kph, what is the length of the third distance travelled?

(A)10 km　　(B)20 km　　(C)30 km
(D)40 km　　(E)None of these

9. A path which is 1 m. wide is partly surrounded by a fence shown in the diagram at right. What is the length of the fence?



(A)20 m　　(B)21 m　　(C)22 m
(D)23 m　　(E)24 m

10. a/b is a fraction. If 2 is added to the numerator, the value of the fraction is 1/2. If 3 is added to the denominator, the fraction has a value of 1/3. The value of the sum $a+b$ is

(A)18　　(B)19　　(C)20
(D)22　　(E)25

11. Everyday, Lisa puts her spare change (nickels and dimes) in a piggy-bank. This weekend she decides to count her savings. She finds that she has 72 coins with a total value of \$4.95. How many dimes does she have?

(A)14　　(B)23　　(C)25
(D)27　　(E)None of these

12. 一天在数学课上，雪莉问老师："尼尔森先生，你多大岁数？"尼尔森先生回答道："今年我的岁数是我妹妹的 3 倍。但是 6 年前我的岁数是她的 5 倍。"问数学老师的岁数是多少？

(A)36　(B)40　(C)49
(D)55　(E)上述答案都不对

13. 4 位网球选手进入锦标赛，第一轮比赛有多少种不同的配对方法？

(A)3　(B)6　(C)8
(D)12　(E)24

14. 一个箱子中装有一些苹果。安德鲁拿走了$\frac{1}{2}$后又拿走了 1 个。比阿特丽斯拿走了余下的$\frac{1}{3}$但又放回去 2 个。柯日那拿走了余下的$\frac{5}{6}$后又拿走了 1 个。现在箱子中还剩有 7 个苹果。问最初箱子中装有多少个苹果？

(A)16　(B)44　(C)110
(D)140　(E)上述答案都不对

15. 由 $4\times4\times4$ 个小立方体组成一个大立方体。大立方体经表面油漆后再拆开成单一的小立方体。问两面被油漆的小立方体有多少个？

(A)8　(B)16　(C)20
(D)24　(E)32

16. 若相同的数字不能出现两次，由 1,2,3,4,5 可以组成多少个三位数？

(A)60　(B)65　(C)80
(D)120　(E)上述答案都不对

17. 一长方形的地板可由尺寸为 1×2 的板块完全覆盖。如果板块不需要被切割、也不需要对折，那么下列哪个尺寸不可能是地板的尺寸。

(A)4×9　(B)8×8　(C)11×7
(D)16×5　(E)上述答案都不对

12. One day in math class, Shelley asks the teacher: "Mr. Nelson, how old are you?" Mr. Nelson responds: "This year I am three times as old as my sister. However, six years ago, I was five times as old as she was. "How old is the mathematics teacher?

(A)36　(B)40　(C)49
(D)55　(E)None of these

13. Four tennis players enter a tournament. How many different ways can the pairings be made for the first round games?

(A)3　(B)6　(C)8
(D)12　(E)24

14. A box contains some apples. Andree takes 1/2 of them along with one extra apple. Beatrice takes 1/3 of the remaining apples along but put two apples back in the box and finally, Corrine takes 5/6 of the remaining apples along with one more apple. There are now seven apples left in the box. How many apples were in the box before Andree took her share?

(A)16　(B)44　(C)110
(D)140　(E)None of these

15. A $4\times4\times4$ cube consisting of smaller cubes is painted and then broken apart. How many of the smaller cubes will have exactly 2 painted sides?

(A)8　(B)16　(C)20
(D)24　(E)32

16. How many three digit numbers can be constructed using the digits 1, 2, 3, 4 and 5 if the same digit cannot appear twice in a row in any of the numbers?

(A)60　(B)65　(C)80
(D)120　(E)None of these

17. A rectangular floor is completely covered with tiles whose size is 1×2. If the tiles are not cut and do not overlap, the size of the floor cannot be

(A)4×9　(B)8×8　(C)11×7
(D)16×5　(E)None of these

18. 10用3个正整数的和表示有多少种方法？正整数可以相同，顺序则没有区别。如 $10=1+4+5$ 与 $10=4+1+5$ 只能算一种方法。

(A)5　　(B)6　　C)7

(D)8　　(E)10

19. 保罗的计算器仅能进行两种运算：使显示的数字加上12或减去7。今天计算器上显示的数字是1 998。若要显示的数字变成2 000，至少需要进行多少步运算？

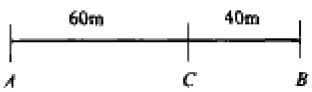
(A)4　　(B)12　　(C)16

(D)21　　(E)24

20. 阿方斯由 A 点出发，按恒定的速度跑向 C 点。在同样的时刻，布丽奇特由 B 点出发，按恒定的速度跑向 C 点。他们在同样的时间到达 C 点。如果他们继续向各自的方向跑去，阿方斯到达 B 点比布丽奇特到达 A 点提前10秒。问布丽奇特跑步的速度是多少？

(A)3 m/s　　(B)$\frac{10}{3}$ m/s　　(C)$\frac{13}{3}$ m/s

(D)5 m/s　　(E)信息不足



18. How many ways can the number 10 be written as the sum of exactly three positive and not necessarily different integers if the order in which the sum is written does not matter? For instance, $10=1+4+5$ is one such sum. This sum is the same as $10=4+1+5$.

(A)5　　(B)6　　(C)7

(D)8　　(E)10

19. Paul's calculator can make only two operations: add 12 to the number displayed, or subtract 7 from it. Today, it shows the number 1 998. What is the minimal number of steps needed to display the number 2 000?

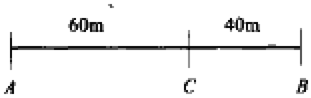
(A)4　　(B)12　　(C)16

(D)21　　(E)24

20. Alphonse starts at point A and runs at a constant rate towards point C. At the same time, Brigitte starts at point B and runs towards point C also at a constant rate. They arrive at C at exactly the same moment. If they continue running in the same directions, Alphonse arrives at B exactly 10 seconds before Brigitte arrives at A. How fast was Brigitte running?

(A)3 m/s　　(B)$\frac{10}{3}$ m/s　　(C)$\frac{13}{3}$ m/s

(D)5 m/s　　(E)Not enough information



试　卷　七

Test　7

1. 当马克到达加油站时，汽油箱的油压表读数为油箱容积的$\frac{1}{8}$。加了 25 升油后，油压表读数为容积的$\frac{5}{8}$。按升表示油箱的容积是多少？

(A)40　(B)45　(C)50
(D)60　(E)上述答案都不对

2. 两个正整数的和是 9，其最大可能的乘积是多少？

(A)8　(B)9　(C)14
(D)20　(E)24

3. 一天早晨一蜗牛决定要爬上 10 米高的墙。白天蜗牛可爬高 3 米，但在夜晚蜗牛又下降 2 米。问需要多少天蜗牛才能爬到墙顶？

(A)7　(B)8　(C)9
(D)10　(E)上述答案都不对

4. 你购物时用硬币支付（注：1 美分，5 美分，10 美分，25 美分），如果你想给营业员最少的硬币个数，问下列哪一笔支付需要的硬币个数最多？

(A)24 美分　(B)44 美分　(C)48 美分
(D)67 美分　(E)96 美分

5. 若定义下列运算：$a\times b=3a-2b$，计算$(4\times2)\times7$的值。

(A)8　(B)10　(C)12
(D)56　(E)上述答案都不对

1. When Marc arrives at a gas station, the gauge on the gasoline tank reads $\frac{1}{8}$ of the total capacity of the tank. After purchasing 25 litres of gasoline, the gauge reads $\frac{5}{8}$ full. What is the capacity, in litres, of the gas tank?

(A)40　(B)45　(C)50
(D)60　(E)None of these

2. The largest possible product of two positive integers whose sum is 9 is

(A)8　(B)9　(C)14
(D)20　(E)24

3. One morning, a snail decides to climb a wall 10 metres in height. During the day, the snail can climb 3 meters but falls back 2 meters at night. How many days will it take for the snail to climb the wall?

(A)7　(B)8　(C)9
(D)10　(E)None of these

4. You make a purchase and pay with coins. If you give the sales clerk the smallest number of coins possible, which of the following amounts would require the most coins to pay for?

(A)24 ¢　(B)44 ¢　(C)48 ¢
(D)67 ¢　(E)96 ¢

5. Suppose that a operation is defined by $a\times b=3a-2b$. What is the result of $(4\times2)\times7$?

(A)8　(B)10　(C)12
(D)56　(E)None of these

6. 在 31 到 131 之间有多少整数可以被 7 整除，但不可以被 6 整除？

(A)11 (B)12 (C)13
(D)14 (E)15

7. 阿方斯的玻璃球是比阿特丽斯的 3 倍。若阿方斯给比阿特丽斯 15 个玻璃球，这时阿方斯的玻璃球是比阿特丽斯的 2 倍。问阿方斯给比阿特丽斯多少玻璃球两人的玻璃球正好相等？

(A)30 (B)45 (C)60
(D)90 (E)信息不足

8. 为一聚会，贾斯廷买了一个比萨饼并切成 24 块。马克吃了$\frac{1}{6}$，克劳迪亚吃了余下的$\frac{1}{4}$。在这两人之后，沙尔维吃了余下的$\frac{1}{3}$，其余的则归贾斯廷。问贾斯廷没有吃到的有几分之几？

(A)$\frac{1}{2}$ (B)$\frac{5}{12}$ (C)$\frac{7}{12}$
(D)$\frac{2}{3}$ (E)上述答案都不对

9. 当 $x=\frac{3}{4}, y=\frac{2}{3}$时，计算$\frac{x+y}{x-y}$的值。

(A)$\frac{5}{3}$ (B)5 (C)6
(D)17 (E)上述答案都不对

10. 下列哪个数值最大？

(A)10^3 (B)4^5 (C)2^9
(D)3^5 (E)5^4

11. 我有一个数字，用这一数字乘以 4 再减去 12 是用这一数字先减去 12 再乘以 4 的两倍。这个数字各位数的和是多少？

(A)3 (B)4 (C)5
(D)7 (E)9

6. How many of the integers between 31 and 131 are divisible by 7 but not divisible by 6?

(A)11 (B)12 (C)13
(D)14 (E)15

7. Alphonse has three times as many marbles as Beatrice. If Alphonse would give 15 of his marbles to Beatrice then he would have twice as many marbles as she would have. How many marbles must Alphonse give to Beatrice so that they each have the same number?

(A)30 (B)45 (C)60
(D)90 (E)Not enough information

8. For a party, Justin buys a pizza and cuts it into 24 pieces. Marc eats $\frac{1}{6}$ of the pizza and Claudine eats $\frac{1}{4}$ of what remains. After both of them have eaten, Sylvie eats $\frac{1}{3}$ of the rest. Justin gets to eat what is left over. What fraction of the pizza did Justin not eat?

(A)$\frac{1}{2}$ (B)$\frac{5}{12}$ (C)$\frac{7}{12}$
(D)$\frac{2}{3}$ (E)None of these

9. Determine the value of $\frac{x+y}{x-y}$ when $x=\frac{3}{4}$ and $y=\frac{2}{3}$.

(A)$\frac{5}{3}$ (B)5 (C)6
(D)17 (E)None of these

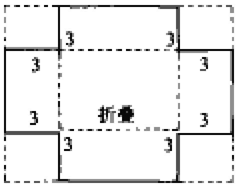
10. Which of the following is the largest?

(A)10^3 (B)4^5 (C)2^9
(D)3^5 (E)5^4

11. I have a number such that if I multiply the number by 4 and subtract 12, I get twice as much as when I first subtract 12 and then multiply by 4. The sum of the digits of my number is

(A)3 (B)4 (C)5
(D)7 (E)9

12. 一公司为其产品设计一包装。包装的一部分是用正方形铝片做成一开口的盒子。铝片各角切掉一3厘米的小方块，然后折成开口的盒子(如图)，盒子的容积为75立方厘米。问铝片的尺寸应是多少?



(A)6×6　　(B)9×9

(C)10×10　　(D)11×11

(E)上述答案都不对

13. 序列1,3,3,3,5,5,5,5,5,7,7,…的第100项是多少?

(A)10　　(B)19　　(C)20

(D)21　　(E)上述答案都不对

14. 我注意到当我将我爸爸岁数的两个数字互换位置，则得到我自己的岁数。当我出生时，他的岁数介于20－30之间。问我出生时我爸爸的岁数是多少?

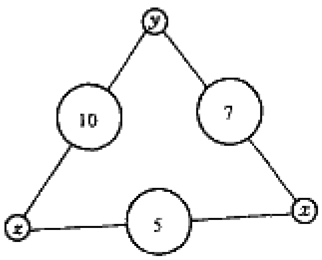
(A)20　　(B)26　　(C)27

(D)30　　(E)上述答案都不对

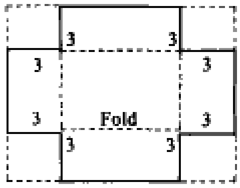
15. 大圆中的数值是由大圆两端小圆中的数值相加得到的。计算小圆中数值的和。

(A)9　　(B)11　　(C)13

(D)20　　(E)上述答案都不对



12. A company is designing a package for its product. One part of the package is to be an open box made from a square piece of aluminium by cutting out a 3 cm square from each corner and folding up the sides (see Figure). The box is to contain 75 cm^3. What are the dimensions in cm × cm of the square piece of aluminium that must be used?



(A)6×6　　(B)9×9

(C)10×10　　(D)11×11

(E)None of these

13. In the sequence 1,3,3,3,5,5,5,5,5,7,7,… the 100th number is

(A)10　　(B)19　　(C)20

(D)21　　(E)None of these

14. I noticed that when I interchanged the digits of my father's age, I got my own age. When I was born, his age was between twenty and thirty years. What was my father's age when I was born?

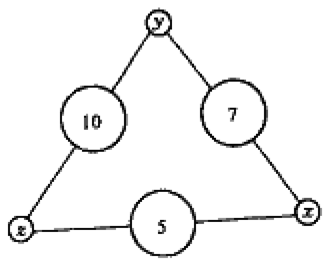
(A)20　　(B)26　　(C)27

(D)30　　(E)None of these

15. The numbers in the larger circles are obtained by adding the two numbers in the smaller circles attached to each larger circle. Determine the sum of the numbers in the small circles.

(A)9　　(B)11　　(C)13

(D)20　　(E)None of these



16. 序列 2,5,8,11,…的第 2 001 项是多少?

(A)5 996 (B)5 999 (C)6 000
(D)6 001 (E)6 002

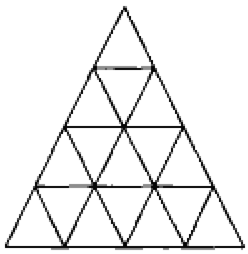
17. 从 2 开始,罗玛按次序写下了所有不是其他数的平方(注:如 $36=6^2$)的整数。他写下的第 100 个数是多少?

(A)107 (B)109 (C)110
(D)111 (E)上述答案都不对

18. 写下包括从 1 至 1 000 的整数需要多少个数字?例如写下 10 需要两个数字。

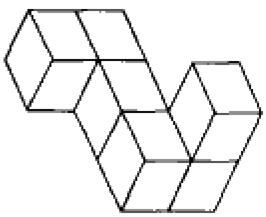
(A)2 889 (B)2 892 (C)2 893
(D)2 899 (E)2 989

19. 图形中有多少个三角形?



(A)16 (B)17
(C)25 (D)26
(E)27

20. 若小方块的边长为 1 厘米,立体图形的表面积是多少平方厘米?



(A)24 (B)25
(C)29 (D)30
(E)上述答案都不对

16. What is the 2 001st number in the sequence: 2, 5, 8, 11, …?

(A)5 996 (B)5 999 (C)6 000
(D)6 001 (E)6 002

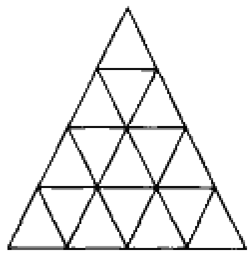
17. Starting with the number 2, Roman writes down, in order, all of the integers which are not perfect squares. What is the 100th number he writes down?

(A)107 (B)109 (C)110
(D)111 (E)None of these

18. How many digits are needed to write all of the integers from 1 to 1 000 inclusive? For example, to write the number 10, one would need 2 digits.

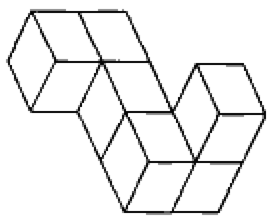
(A)2 889 (B)2 892 (C)2 893
(D)2 899 (E)2 989

19. How many triangles are contained in this figure?



(A)16 (B)17
(C)25 (D)26
(E)27

20. What is the surface area in cm^2 of the solid figure shown if the cubes measure 1 cm on each side?



(A)24 (B)25
(C)29 (D)30
(E)None of these

试 卷 八

Test 8

1. 阿劳吃了比萨饼的$\frac{1}{5}$，亚西列吃了其余的$\frac{3}{4}$。问还有多少留给了保罗？
(A)20%　(B)25%　(C)40%
(D)60%　(E)上述答案都不对

2. 下列哪一个分数值最大？
(A)$\frac{(3-2)}{(8-2)}$　(B)$\frac{3}{8}$　(C)$\frac{(3+12)}{(8+12)}$
(D)$\frac{(3+1)}{(8+1)}$　(E)$\frac{(3+2)}{(8+2)}$

3. 可被 18 整除的数的和是多少？
(A)21　(B)31　(C)37
(D)38　(E)39

4. 有多少方法使 13 表示为 3 个不同正整数的和？注意 13 = 4 + 8 + 1 和 13 = 1 + 4 + 8 只算一种方法。
(A)5　(B)6　(C)7
(D)8　(E)14

5. 9 只母鸡在 4 天内下 12 只蛋，问 4 只母鸡在 9 天内下多少蛋？
(A)11　(B)12　(C)13
(D)14　(E)15

6. 吉恩前三门考试的平均成绩为 76 分。吉恩后二门考试的平均成绩是多少才能使所有考试的平均成绩为 80 分？
(A)80　(B)84　(C)85
(D)86　(E)上述答案都不对

1. Alain has eaten $\frac{1}{5}$ of a pizza and Yacine has eaten $\frac{3}{4}$ of the rest. What portion of the pizza is left for Paul?
(A)20%　(B)25%　(C)40%
(D)60%　(E)None of these

2. Which of the following fractions is the largest?
(A)$\frac{(3-2)}{(8-2)}$　(B)$\frac{3}{8}$　(C)$\frac{(3+12)}{(8+12)}$
(D)$\frac{(3+1)}{(8+1)}$　(E)$\frac{(3+2)}{(8+2)}$

3. What is the sum of all the integers which divide 18 evenly?
(A)21　(B)31　(C)37
(D)38　(E)39

4. How many ways can the value 13 be expressed as the sum of exactly 3 different positive integers? For example, 13 = 1 + 4 + 8 is one such way. Note that 13 = 4 + 8 + 1 does not count as a "different" way since the same integers are involved in the sum.
(A)5　(B)6　(C)7
(D)8　(E)14

5. Nine hens lay 12 eggs in 4 days. How many eggs will 4 hens lay in 9 days?
(A)11　(B)12　(C)13
(D)14　(E)15

6. The average mark on the first 3 tests Jean took was 76. What average mark does Jean need on the next two tests to have an average of 80 for all of the tests?
(A)80　(B)84　(C)85
(D)86　(E)None of these

7. 三个大于 1 且不相同的整数相乘。其乘积不可能是下列哪一项?

(A)24　(B)30　(C)72

(D)90　(E)上述答案都不对

7. Three different integers each greater than one are multiplied together. The result cannot be equal to

(A)24　(B)30　(C)72

(D)90　(E)None of these

8. 定义 $a\times b=ab-b$。计算$(4\times 1)\times 3$的值。

(A)0　(B)1　(C)6

(D)9　(E)12

8. Suppose $a\times b=ab-b$ for every pair of integers a and b. What is the result of $(4\times 1)\times 3$?

(A)0　(B)1　(C)6

(D)9　(E)12

9. 一个数由 4 位数组成。最后一位数是第一位数的 4 倍,第二位数是第一位数的 6 倍,第三位数等于第二位数加上 3。问各位上的数字和是多少?

(A)9　(B)10　(C)11

(D)20　(E)23

9. A number is composed of 4 digits. The last digit is equal to 4 times the first digit, the second digit is equal to 6 times the first digit and the third digit is equal to 3 plus the second digit. What is the sum of this number's digits?

(A)9　(B)10　(C)11

(D)20　(E)23

10. 一个篮子中装有一些苹果。艾丽丝取出了$\frac{1}{2}$,然后又放回了 15 个苹果。巴里取出了余下的$\frac{1}{2}$,然后又放回了 10 个苹果。他们发现两人的苹果个数相同。问篮子中还留有多少个苹果?

(A)10　(B)20　(C)30

(D)50　(E)信息不足

10. A basket contains some apples. Alice takes $\frac{1}{2}$ of the apples and then places 15 of the apples back in the basket. Barry then takes $\frac{1}{2}$ of the remaining apples and places 10 back in the basket. They find that each of them has the same number of apples. How many apples are left in the basket?

(A)10　(B)20　(C)30

(D)50　(E)Not enough information

11. 一公共汽车上有些乘客。在第一站有$\frac{1}{3}$的乘客下车,另有 8 人上车。在第二站有余下的$\frac{1}{2}$的乘客下车,另有 2 人上车。现在车上的乘客是汽车出发时车上乘客的一半。问汽车出发时车上一共有多少乘客?

(A)18　(B)24　(C)27

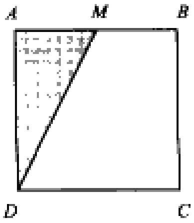
(D)30　(E)36

11. A bus starts off with some passengers. At the first stop, $\frac{1}{3}$ of the passengers get off and 8 people get on. At the second stop, $\frac{1}{2}$ of the passengers remaining get off and 2 people get on the bus. There are now half as many passengers as started the trip. How many persons started the trip?

(A)18　(B)24　(C)27

(D)30　(E)36

12. 考虑正方形 $ABCD$。M 点是 AB 的中点，如果 $\triangle AMD$ 的面积是 4，计算正方形 $ABCD$ 的面积。

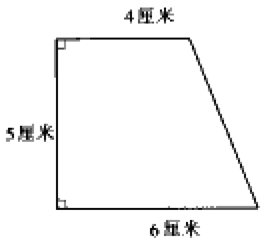


(A)9　(B)11
(C)16　(D)20
(E)上述答案都不对

13. 下列哪一项最大？
(A)$2^{10}3^5$　(B)2^{17}　(C)4^8
(D)6^7　(E)3^9

14. 一个数乘以 2、再减去 4 后得到一结果。这一结果除以 4、再加上 5 后又得到原来的数。问这个数是多少？
(A)3　(B)8　(C)9
(D)10　(E)18

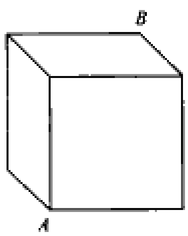
15. 图形的面积是多少平方厘米？



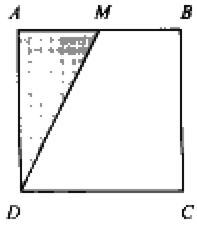
(A)20　(B)22
(C)25　(D)30
(E)40

16. 在容器 A、B、C 中共倒入 209 升水。容器 B 中的水比容器 A 中的水多 50%，容器 C 中的水比容器 B 中的水多 50%。问容器 B 中的水有多少升？
(A)40　(B)44　(C)60
(D)66　(E)99

17. 一蚂蚁从顶角 A 出发，沿着立方体的棱走过每一顶角一次，最后到达顶角 B。问有多少棱蚂蚁没有走过？



12. Consider the square $ABCD$. M is in the middle of AB. If the area of triangle AMD is 4, find the area of the square $ABCD$.

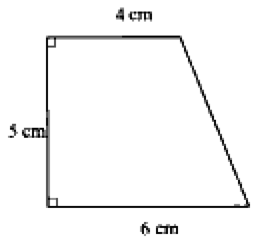


(A)9　(B)11
(C)16　(D)20
(E)None of these

13. Which of the following is the largest?
(A)$2^{10}3^5$　(B)2^{17}　(C)4^8
(D)6^7　(E)3^9

14. Find a number such that, when we multiply it by 2, and 4 is subtracted from the result, and, this new result is divided by 4 and 5 is added to the final result, we obtain the same number as we started with.
(A)3　(B)8　(C)9
(D)10　(E)18

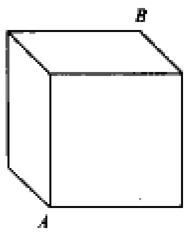
15. The area of the figure, in square centimetres, is



(A)20　(B)22
(C)25　(D)30
(E)40

16. 209 litres of water are poured into containers A, B and C. B contains 50% more water than A and C contains 50% more water than B. How many litres of water are in B?
(A)40　(B)44　(C)60
(D)66　(E)99

17. An ant starts at corner A and walks along the edges of a cube visiting every corner of the cube exactly one time. The ant finishes the walk at corner B. How many edges does the ant not walk on?



(A)2　　(B)3

(C)4　　(D)5

(E)棱数取决于路径

18. 序列 1,2,3,4,5,8,7,16,9,…的下一项是多少?

(A)8　　(B)11　　(C)18

(D)23　　(E)32

19. 将整数 1 至 25 相乘,问乘积带有多少个零(注:如 100 带有两个零)?

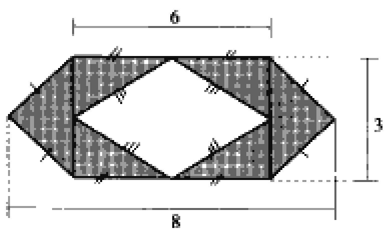
(A)2　　(B)3　　(C)4

(D)5　　(E)6

20. 阴影部分的面积是多少?(带有相同符号的线段相等。)

(A)8　　(B)10　　(C)12

(D)15　　(E)上述答案都不对



(A)2　　(B)3

(C)4　　(D)5

(E)The number depends on the path taken

18. What is the next number in the sequence:1,2,3,4,5,8,7,16,9,…?

(A)8　　(B)11　　(C)18

(D)23　　(E)32

19. The integers from 1 to 25 are multiplied together. How many zeros does the result end in?

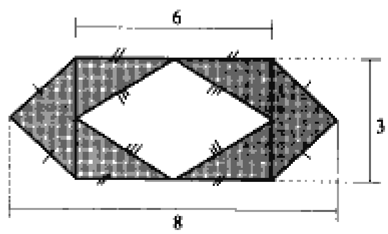
(A)2　　(B)3　　(C)4

(D)5　　(E)6

20. What is the area of the shaded region? Line segments that are marked with the same symbol are equal in length.

(A)8　　(B)10　　(C)12

(D)15　　(E)None of these



试　卷　九

Test 9

1. 两本书一共花费 20.95 美元。其中一本书比另一本书多花费 3.15 美元。另一本书的售价是多少？
(A)8.50 美元　(B)9.25 美元　(C)11.45 美元
(D)12.45 美元　(E)上述答案都不对

2. 6 年前，塞缪尔是他现在岁数的$\frac{3}{5}$。问塞缪尔现在多大岁数？
(A)15　(B)21　(C)25
(D)30　(E)上述答案都不对

3. $\frac{99\times101}{0.10}$的值最接近多少？
(A)100　(B)1 000　(C)10 000
(D)100 000　(E)1 000 000

4. 如果 A 是 C 的 10%，B 是 C 的 25%，那么 A 是 B 的百分之几？
(A)2.5　(B)15　(C)35
(D)40　(E)250

5. 如果$\frac{x-1}{x+1}=\frac{30}{42}$，那么 x 等于多少？
(A)4　(B)5　(C)6
(D)7　(E)31

6. 水按每分钟 4 升的速率注入一容器中。当容器中有 50 升水时，开始用泵按每分钟 5 升的速率向外抽水。问需要多少分钟才能抽干容器？
(A)10　(B)24　(C)50
(D)120　(E)上述答案都不对

1. Two books cost a total of \$20.95. One of the books costs \$3.15 more than the other. What is the cost of the less expensive book?
(A) \$8.50　(B) \$9.25　(C) \$11.45
(D) \$12.45　(E) None of these

2. Six years ago, Samuel was 3/5 of his current age. How old is Samuel now?
(A)15　(B)21　(C)25
(D)30　(E)None of these

3. The value of $\frac{99\times101}{0.10}$ is closest to
(A)100　(B)1 000　(C)10 000
(D)100 000　(E)1 000 000

4. If A is 10% of C, and B is 25% of C, what percent of B is A?
(A)2.5　(B)15　(C)35
(D)40　(E)250

5. If $\frac{x-1}{x+1}=\frac{30}{42}$, what is the value of x?
(A)4　(B)5　(C)6
(D)7　(E)31

6. Water pours into a container at a constant rate of 4 litres per minute. When there are 50 litres of water in the container, a pump begins to pump water out at a rate of 5 litres per minute. How many minutes will it take to empty the container?
(A)10　(B)24　(C)50
(D)120　(E)None of these

7. 假定 $a \times b = b + \frac{1}{a}$,计算$(1\times2)\times3$的值。

(A)$\frac{3}{10}$　(B)$\frac{9}{7}$　(C)$\frac{11}{6}$

(D)$\frac{10}{3}$　(E)$\frac{11}{3}$

8. 序列2,1,3,4,7,11,…的下一项是多少?

(A)10　(B)12　(C)15

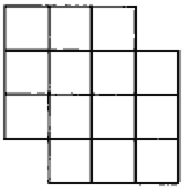
(D)18　(E)22

9. 艾丽丝被测试了3次。她第二次测试成绩是第一次的2倍,第三次测试成绩是第二次的3倍。3次测试的平均成绩为60分。问第二次的测试成绩是多少分?

(A)20　(B)40　(C)60

(D)120　(E)信息不足

10. 图示中有多少个不同的正方形?



(A)19　(B)20

(C)21　(D)22

(E)23

11. 一学生从家出发步行去学校,并且按相同的路线乘公共汽车回家。整个来回需要40分钟。如果公共汽车的速度是学生步行速度的7倍,学生来回都步行需要多长时间?

(A)60分钟　(B)70分钟　(C)75分钟

(D)80分钟　(E)上述答案都不对

12. 在射箭比赛中,格林射中靶心的次数是贾森的3倍。贾森比凯文射中靶心的次数少4次。埃迪射中靶心的次数是凯文的2倍减去1。莱斯莉射中靶心的次数是贾森和格林的总和。如果凯文射中靶心9次,问靶心一共被射中多少次?

7. Suppose that $a \times b = b + \frac{1}{a}$. What is the value of $(1\times2)\times3$?

(A)$\frac{3}{10}$　(B)$\frac{9}{7}$　(C)$\frac{11}{6}$

(D)$\frac{10}{3}$　(E)$\frac{11}{3}$

8. What is the next number in the sequence 2,1,3,4,7,11,…?

(A)10　(B)12　(C)15

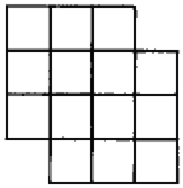
(D)18　(E)22

9. Alice was tested three times. Her second test mark was twice as large as the first and the third mark was three times as large as the second. The average mark for all three tests was 60. What was the second mark?

(A)20　(B)40　(C)60

(D)120　(E)Not enough information

10. How many different squares are there in the figure shown at right?



(A)19　(B)20

(C)21　(D)22

(E)23

11. A student walks from home to school and returns riding on a bus along the same route. The entire trip takes 40 minutes. If the bus travels 7 times as fast as the student can walk, how long would it take the student to walk in both directions?

(A)60 min　(B)70 min　(C)75 min

(D)80 min　(E)None of these

12. In an archery competition, Galen hits the bullseye three times as often as Jason. Jason hits it four times fewer than Kevin and Eddy hits it one less than twice the number of times that Kevin does. Nathalie hits the bullseye as many times as Jason and Galen combined. If Kevin hits the bullseye 9 times, how many times was the bullseye hit?

(A)24　(B)42　(C)54
(D)60　(E)66

13. 在15至75之间有多少偶数不能被3整除?
(A)10　(B)15　(C)20
(D)30　(E)45

14. 从1至100之间选择6个整数,并且要使任何2个数之间差值中的最小正值尽可能大。这个差值是多少?
(A)16　(B)17　(C)19
(D)20　(E)上述答案都不对

15. 乘以40的积为另一整数的平方的最小正整数是多少?
(A)2　(B)5　(C)20
(D)40　(E)上述答案都不对

16. 序列1, -2,3,4, -5,6,7, -8,9,10,…的前100项的和是1 750。问序列1,2, -3,4,5, -6,7,8, -9,10,…的前100项的和是多少?
(A)1 684　(B)1 717　(C)1 783
(D)1 816　(E)上述答案都不对

17. 下列哪一项的值最小?
(A)$\frac{2}{1-\frac{1}{3}}$　(B)$\frac{2}{1+\frac{1}{3}}$　(C)$\frac{3}{1+\frac{1}{2}}$
(D)$\frac{3}{1-\frac{1}{2}}$　(E)$\frac{2}{\frac{1}{2}+\frac{1}{3}}$

18. 乔纳森选了一个两位数,并且减去了个位数和十位数的和。下列哪一个数可能是计算结果?
(A)42　(B)49　(C)55
(D)63　(E)信息不足

19. 前15个奇数相乘,乘积的个位数是多少?

(A)24　(B)42　(C)54
(D)60　(E)66

13. How many even integers between 15 and 75 are not evenly divisible by 3?
(A)10　(B)15　(C)20
(D)30　(E)45

14. Six integers are selected from 1 to 100 in such a way that the smallest positive difference between any two of them is as large as possible. What is this difference?
(A)16　(B)17　(C)19
(D)20　(E)None of these

15. What is the smallest positive integer which multiplied by 40 gives a perfect square?
(A)2　(B)5　(C)20
(D)40　(E)None of these

16. The sum of the first 100 terms of the sequence 1, -2,3,4, -5,6,7, -8,9,10,… is 1 750. The sum of the first 100 terms of the sequence 1,2, -3,4,5, -6,7,8, -9,10,… is equal to
(A)1 684　(B)1 717　(C)1 783
(D)1 816　(E)None of these

17. Which of the following is the smallest?
(A)$\frac{2}{1-\frac{1}{3}}$　(B)$\frac{2}{1+\frac{1}{3}}$　(C)$\frac{3}{1+\frac{1}{2}}$
(D)$\frac{3}{1-\frac{1}{2}}$　(E)$\frac{2}{\frac{1}{2}+\frac{1}{3}}$

18. Jonas takes a two-digit number and subtracts the sum of the digits from it. Which of the following answeres is a possible result of the calculation?
(A)42　(B)49　(C)55
(D)63　(E)Not enough information

19. The first 15 odd integers are multiplied together. The answer ends with the digit

(A)1　　(B)3　　(C)5

(D)7　　(E)9

20. 在 3×3 的表格中填上数字 1~9 各一次。各行和各列的和已在表旁给出。问 * 号格中的数字是多少?

			15
			12
		*	18
24	6	15	

(A)4　　(B)5

(C)6　　(D)7

(E)上述答案都不对

(A)1　　(B)3　　(C)5

(D)7　　(E)9

20. The integers from 1 to 9 are each written once in a 3×3 table. The totals of the values in each row and column are given. What number is in the space indicated by the * ?

			15
			12
		*	18
24	6	15	

(A)4　　(B)5

(C)6　　(D)7

(E)None of these

试 卷 十

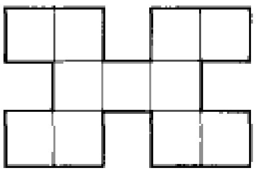
Test 10

1. 序列 2,5,8,11,14,17,4…的下一项是多少?
   (A)19 (B)20 (C)21
   (D)25 (E)31

2. 在 1 立方千米中有多少个立方毫米?
   (A)10^9 (B)10^{12} (C)10^{15}
   (D)10^{18} (E)10^{21}

3. 某班级 30 个学生的一项考试平均成绩为 80 分。若有 15 个同学的成绩能提高 10 分,问全班的平均成绩是多少分?
   (A)75 (B)80 (C)85
   (D)90 (E)信息不足

4. 下图的周长是多少?图中小方块为 1×1 个单位。



   (A)20 (B)21
   (C)22 (D)23
   (E)24

5. 从 5 开始,每隔 7 数一个数字,塞缪尔开始数 5,12,19,…问会数到下列哪一个数?
   (A)85 (B)86 (C)87
   (D)88 (E)89

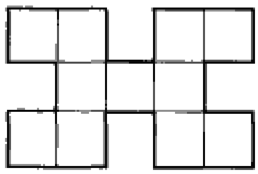
6. 如果一个数的 3%是 12,问这个数为多少?
   (A)0.36 (B)33.3 (C)360
   (D)400 (E)上述答案都不对

1. What is the next number in the sequence 2,5,8,11,14,17,…?
   (A)19 (B)20 (C)21
   (D)25 (E)31

2. How many cubic millimetres are in a cubic kilometre?
   (A)10^9 (B)10^{12} (C)10^{15}
   (D)10^{18} (E)10^{21}

3. The average of the marks on an exam in a class of 30 students was 80points. If 15 of the students had each gotten a mark which was 10 points higher, what would the average have been for the class on this exam?
   (A)75 (B)80 (C)85
   (D)90 (E)Not enough information

4. What is the perimeter length of the figure shown below? The figure consists of 1×1 blocks.



   (A)20 (B)21
   (C)22 (D)23
   (E)24

5. Starting at 5 and counting by 7's, Samuel counts 5,12,19,…A number that will be counted is
   (A)85 (B)86 (C)87
   (D)88 (E)89

6. If 3% of a number is 12, then the number is
   (A)0.36 (B)33.3 (C)360
   (D)400 (E)None of these

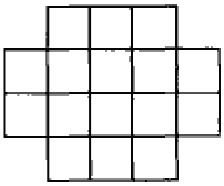
7. 一个班级有 25 个学生，其中 18 个学生喜欢数学、22 个学生喜欢音乐。如果班上的学生每人至少喜欢数学和音乐中的一门学科，问班里有多少学生喜欢上述两门学科？

(A)3　(B)7　(C)15
(D)20　(E)上述答案都不对

8. 下列哪一项的值最大？

(A)$\frac{2}{1-\frac{1}{3}}$　(B)$\frac{2}{1+\frac{1}{3}}$　(C)$\frac{3}{1-\frac{1}{2}}$
(D)$\frac{3}{1+\frac{1}{2}}$　(E)$\frac{1}{\frac{1}{2}+\frac{1}{3}}$

9. 图中显示有多少正方形？该图形是由 16 个边长为 1 的正方形组成。



(A)20　(B)24
(C)25　(D)26
(E)27

10. 班里有半数同学是女生。如果班里的男生人数增加一倍，女生人数减少一半，那么男生在班里占百分之几？

(A)50%　(B)60%　(C)75%
(D)80%　(E)信息不足

11. 一汽车的行驶速度为每小时 30 千米。问汽车 30 秒钟的行驶距离是多少？

(A)25 米　(B)250 米　(C)324 米
(D)1 500 米　(E)15 000 米

12. 在点 A 和点 B 之间有多少不同的路径？(在圆弧上前进的方向为顺时针方向，在线段上前进的方向为小圆到大圆的方向。在各圆弧和线段上只能行走一次。)

(A)4　(B)5　(C)6
(D)7　(E)10

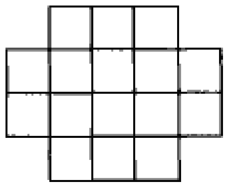
7. In a class of 25 students, 18 students enjoy mathematics and 22 students enjoy music. If every student in the class enjoys at least one of these, how many students in the class enjoy both?

(A)3　(B)7　(C)15
(D)20　(E)None of these

8. Which of the following is the largest?

(A)$\frac{2}{1-\frac{1}{3}}$　(B)$\frac{2}{1+\frac{1}{3}}$　(C)$\frac{3}{1-\frac{1}{2}}$
(D)$\frac{3}{1+\frac{1}{2}}$　(E)$\frac{1}{\frac{1}{2}+\frac{1}{3}}$

9. How many squares can be found in the figure shown? The figure is constructed from 16 small squares each having lengths of 1.



(A)20　(B)24
(C)25　(D)26　(E)27

10. Half of the students in a class are girls. If the number of boys was twice as large and the number of grils half as large, what would the percentage of boys in the class become?

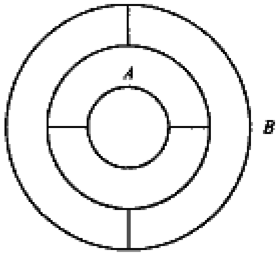
(A)50%　(B)60%　(C)75%
(D)80%　(E)Not enough information

11. An automobile travels at 30 km/h. The distance, in metres, it travels in 30 seconds is

(A)25 m　(B)250 m　(C)324 m
(D)1 500 m　(E)15 000 m

12. How many different paths are there between A and B? Each path must travel along arcs of the circle only in a clockwise direction. On the straight line segments, the path can go only from a smaller circle to a larger circle. No arc or line segment can be travelled more than once in the same path.

(A)4　(B)5　(C)6
(D)7　(E)10



13. 4 个代表队参加两次淘汰制足球锦标赛。在这种锦标赛中，每一队输两场就被淘汰出局。问至少需要进行多少场比赛才能决出冠军？
(A)3　(B)6　(C)9
(D)上述答案都不对　(E)信息不足

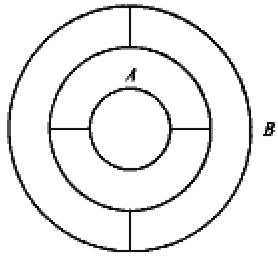
14. 一长方形的边长为整数，面积为 24 平方米，周长为 22 米。问长方形的短边长是多少？
(A)2 米　(B)3 米　(C)4 米
(D)6 米　(E)8 米

15. 给你一组三个数。这三个数两两相加的和分别为 23、32 和 39。问这三个数的和是多少？
(A)44　(B)47　(C)50
(D)94　(E)上述答案都不对

16. 从 1～30 所有整数的和是 465。从 1～30 中所有能被 3 整除的整数的和是多少？
(A)135　(B)155　(C)156
(D)165　(E)上述答案都不对

17. 标记为 A 的空格中的数字是多少？每一空格都含有一数字。
(A)5　(B)6
(C)7　(D)8
(E)9

				总和
		A	4	20
		4	9	
	8			13
总和	24		16	55



13. Four teams play a double knockout soccer tournament. In such a tournament, each team is eliminated after two losses. What is the minimum number of games needed to determine a winner?
(A)3　(B)6　(C)9
(D)None of these　(E)Not enough information

14. The area of a rectangle whose sides have integer length is 24 m^2 and its perimeter is 22 m. What is the length of the small side of this rectangle?
(A)2 m　(B)3 m　(C)4 m
(D)6 m　(E)8 m

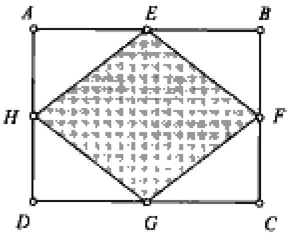
15. You are given a set of three numbers. If the numbers are added together two at a time, the sums are 23, 32 and 39. What is the sum of the three numbers?
(A)44　(B)47　(C)50
(D)94　(E)None of these

16. The sum of all of the integers from 1 to 30 is 465. The sum of all of the integers from 1 to 30 that are divisible by 3 is
(A)135　(B)155　(C)156
(D)165　(E)None of these

17. What is the value of the number in the box labelled A? Each of the empty spaces contains a number.
(A)5　(B)6
(C)7　(D)8
(E)9

				Total
		A	4	20
		4	9	
	8			13
Total	24		16	55

18. 长方形 $ABCD$ 的面积是 12 平方米，E、F、G、H 是长方形各边的中点。问四边形 $EFGH$ 的面积是多少？

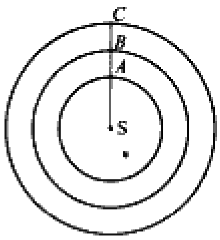


(A)3 平方米
(B)4 平方米
(C)6 平方米
(D)8 平方米
(E)上述答案都不对

19. 计算 $\left(1+\frac{1}{1}\right)\times\left(1+\frac{1}{2}\right)\times\left(1+\frac{1}{3}\right)\times\left(1+\frac{1}{4}\right)\times\cdots\times\left(1+\frac{1}{2\,004}\right)$的值。

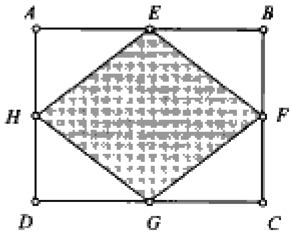
(A)0　　(B)2 004　　(C)2 005
(D)4 008　　(E)上述答案都不对

20. 如下图所示，三个行星成一直线。行星 A 绕太阳一周需 2 年。行星 B 绕太阳一周需 4 年。行星 C 绕太阳一周需 6 年。问至少需要多少年三个行星又处于同一直线上？



(A)6 年　　(B)8 年　　(C)9 年
(D)12 年　　(E)24 年

18. The area of rectangle $ABCD$ is 12 m^2. E, F, G and H are the midpoints of the sides of rectangle $ABCD$. What is the area of the quadrilateral $EFGH$?

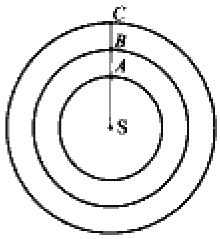


(A)3 m^2　　(B)4 m^2
(C)6 m^2　　(D)8 m^2
(E)None of these

19. Find the value of $\left(1+\frac{1}{1}\right)\times\left(1+\frac{1}{2}\right)\times\left(1+\frac{1}{3}\right)\times\left(1+\frac{1}{4}\right)\times\cdots\times\left(1+\frac{1}{2\,004}\right)$

(A)0　　(B)2 004　　(C)2 005
(D)4 008　　(E)None of these

20. Three planets are in straight line as in the diagram below. Planet A makes a complete revolution around the Sun in 2 years. Planet B makes its revolution in 4 years and Planet C in 6 years. What is the least number of years before all three planets will once again be on the same line?



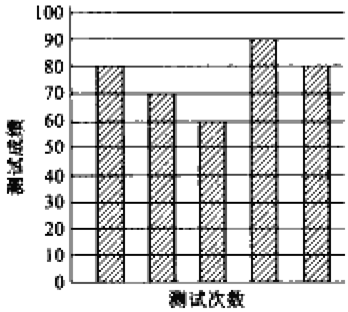
(A)6 years　　(B)8 years　　(C)9 years
(D)12 years　　(E)24 years

试卷十一

Test 11

1. 珍妮记录下 5 次考试，把取得的分数列在图表中。她这 5 次考试的平均成绩是多少？

(A)74　(B)76　(C)70　(D)64　(E)79



2. 有一机器每分钟生产 150 件产品，问该机器 10 秒钟生产多少件产品？

(A)10　(B)15　(C)20　(C)25　(D)30

3. 在一乘法题中，四个空格中的数字和是多少？

(A)13　(B)12　(C)27　(D)9　(E)22

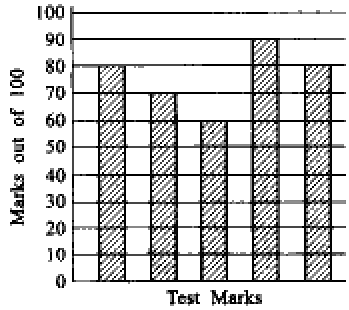
```
     879
   ×492
   □758
  7□11
 35□6
 43□468
```

4. 一长方形运动场为 80 米长、60 米宽。若栅栏柱安插在运动场的四个角上、并且沿各边按 10 米间距安插。问绕运动场一周一共有多少栅栏柱？

(A)24　(B)26　(C)28　(D)30　(E)32

1. Jean writes five tests and achieves the marks shown on the graph. What is her average mark on these five tests?

(A)74　(B)76　(C)70　(D)64　(E)79



2. If a machine produces 150 items in one minute, how many would it produce in 10 seconds?

(A)10　(B)15　(C)20　(C)25　(D)30

3. In the multiplication question, the sum of the digits in the four boxes is

(A)13　(B)12　(C)27　(D)9　(E)22

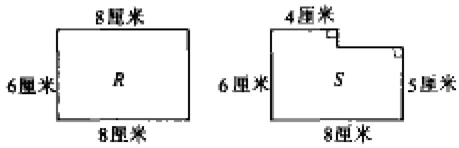
```
     879
   ×492
   □758
  7□11
 35□6
 43□468
```

4. A rectangular field is 80m long and 60m wide. If fence posts are placed at the corners and are 10 m apart along the 4 sides of the field, how many posts are needed to completely fence the field?

(A)24　(B)26　(C)28　(D)30　(E)32

5. 星期二的最高温度比星期一的高 4℃。星期三的最高温度比星期一的低 6℃。如果星期二的最高温度是 22℃,问星期三的最高温度是多少?
(A)20℃　(B)24℃　(C)12℃
(D)32℃　(E)16℃

6. 卡恩从一张纸片上剪出一长方形 R,再从长方形 R 上剪掉一小长方形,得到图形 S,比较 R 和 S。
(A)面积和周长都减小
(B)面积减小、周长增加
(C)面积和周长都增加
(D)面积增加、周长减小
(E)面积减小、周长不变



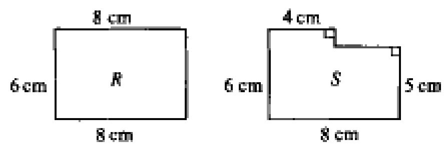
7. 史蒂夫每 3 分钟种 10 棵树。若他以同样的速度连续栽种,问他种 2 500 棵树需要多长时间?
(A)$1\frac{1}{4}$小时　(B)3 小时
(C)5 小时　(D)10 小时
(E)$12\frac{1}{2}$小时

8. 图形的形式△●□▲○按下列序列重复:
△,●,□,▲,○,△,●,□,▲,○,…
问序列的第 214 项是什么图形?
(A)△　(B)●　(C)□
(D)▲　(E)○

9. 一个立方体的体积是 125 立方厘米。问立方体一个面的面积是多少?
(A)20 平方厘米　(B)25 平方厘米
(C)$41\frac{2}{3}$平方厘米　(D)5 平方厘米
(E)75 平方厘米

5. Tuesday's high temperature was 4℃ warmer than that of Monday's. Wednesday's high temperature was 6℃ cooler than that of Monday's. If Tuesday's high temperature was 22℃, what was Wednesday's high temperature?
(A)20℃　(B)24℃　(C)12℃
(D)32℃　(E)16℃

6. Kalyn cut rectangle R from a sheet of paper. A smaller rectangle is then cut from the large rectangle R to produce figure S. In comparing R to S
(A)the area and perimeter both decrease
(B)the area decreases and the perimeter increases
(C)the area and perimeter both increase
(D)the area increases and the perimeter decreases
(E)the area decreases and the perimeter stays the same



7. Steve plants ten trees every three minutes. If he continues planting at the same rate, how long will it take him to plant 2 500 trees?
(A)$1\frac{1}{4}$ h　(B)3 h
(C)5 h　(D)10 h
(E)$12\frac{1}{2}$ h

8. The pattern of figures△●□▲○ is repeated in the sequence △,●,□,▲,○,△,●,□,▲,○,…
The 214th figure in the sequence is
(A)△　(B)●　(C)□
(D)▲　(E)○

9. A cube has a volume of 125 cm^3. What is the area of one face of the cube?
(A)20 cm^2　(B)25 cm^2
(C)$41\frac{2}{3}$ cm^2　(D)5 cm^2
(E)75 cm^2

10. 如图所示的是一魔力正方形。正方形中小方块的数字横向、纵向及对角线方向上的和都相等。问 n 值是多少？

8		
9		5
4	n	

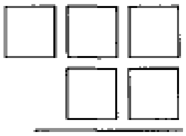
(A)3 (B)6
(C)7 (D)10
(E)11

10. The diagram shows a magic square in which the sums of the numbers in any row, column or diagonal are equal. What is the value of n?

8		
9		5
4	n	

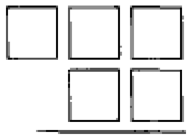
(A)3 (B)6
(C)7 (D)10
(E)11

11. 将数字 3,5,6,7 和 8 分别放在图中的空格中。若用组成的 3 位数减去 2 位数，那么最小的差值是多少？



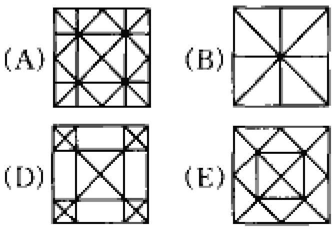
(A)269 (B)278
(C)484 (D)271
(E)261

11. Each of the digits 3, 5, 6, 7, and 8 is placed one to a box in the diagram. If the two digit number is subtracted from the three digit number, what is the smallest difference?

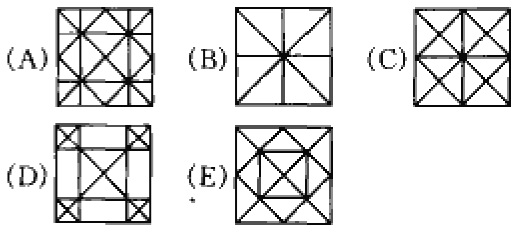


(A)269 (B)278
(C)484 (D)271
(E)261

12. 克莱尔取了一张正方形的纸，并将纸对折 4 次，每次做成一个直角等腰三角形。问将纸展开后，纸上留下的折缝是哪一种形式？



12. Claire takes a square piece of paper and folds it in half four time without unfolding, making an isosceles right triangle each time. After unfolding the paper to form a square again, the creases on the paper would look like



13. 英文"GAUSS"的字母和数字"1 998"分别循环，并记上数码：

1. AUSSG 9 981
2. USSGA 9 819
3. SSGAU 8 199

等等。

若按这一模式循环，GAUSS 1 998 前面的数码应是多少？

(A)4 (B)5 (C)9
(D)16 (E)20

13. The letters of the word "GAUSS" and the digits in the number "1 998" are each cycled separately and then numbered as shown.

1. AUSSG 9 981
2. USSGA 9 819
3. SSGAU 8 199

etc.

If the pattern continues in this way, what number will appear in front of GAUSS 1 998?

(A)4 (B)5 (C)9
(D)16 (E)20

14. 朱安和玛丽玩一种两人游戏，赢者得 2 分，输者失 1 分。如果朱安赢了 3 盘，玛丽最终总分为 5 分，问他们一共玩了多少盘游戏？

(A)7 (B)8
(C)4 (D)5
(E)11

15. 将一立方体的 12 条边涂上红色或绿色。要求每一个面至少有一条红色的边。问最少有多少条红色的边？

(A)2 (B)3
(C)4 (D)5
(E)6

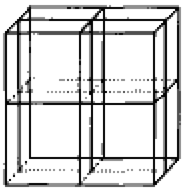
16. 一圆周上有均匀分布的 10 个点。将这些点相连可以形成多少条不同的弦？（弦是连接圆周上两点的一条直线段）

(A)9 (B)45
(C)17 (D)66
(E)55

17. 一肥皂每使用一次，它的体积减少 10%。问肥皂最少被使用多少次，它的体积会小于一半？

(A)5 (B)6
(C)7 (D)8
(E)9

18. 一立方体的尺寸为 10 厘米×10 厘米×10 厘米，如图所示，在各对平行表面中间切三刀得到 8 个小立方体。问总表面积增加了多少？



(A)300 平方厘米 (B)800 平方厘米
(C)1 200 平方厘米 (D)600 平方厘米
(E)0 平方厘米

14. Juan and Mary play a two-person game in which the winner gains 2 points and the loser loses 1 point. If Juan won exactly 3 games and Mary had a final score of 5 points, how many games did they play?

(A)7 (B)8
(C)4 (D)5
(E)11

15. Each of the 12 edges of a cube is coloured either red on green. Every face of the cube has at least one red edge. What is the smallest number of red edges?

(A)2 (B)3
(C)4 (D)5
(E)6

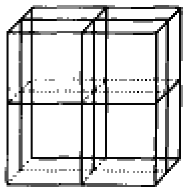
16. Ten points are spaced equally around a circle. How many different chords can be formed by joining any 2 of these points? (A chord is a straight line joining two points on the circumference of a circle.)

(A)9 (B)45
(C)17 (D)66
(E)55

17. Each time a bar of soap is used, its volume decreases by 10%. What is the minimum number of times a new bar would have to be used so that less than one-half its volume remains?

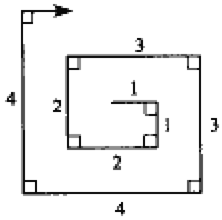
(A)5 (B)6
(C)7 (D)8
(E)9

18. A cube measures 10 cm × 10 cm × 10 cm. Three cuts are made parllel to the faces of the cube as shown creating eight separate solids which are then separated. What is the increase in the total surface area?



(A)300 cm^2 (B)800 cm^2
(C)1 200 cm^2 (D)600 cm^2
(E)0 cm^2

19. 达拉在一张大纸片上建"长方形螺旋",其方法是以厘米为单位画长度为1,1,2,2,3,3,4,4,…的线段,如图所示。在总长度为3 000厘米时,他的钢笔墨水用完了。问达拉画的最长的线段是多少厘米?

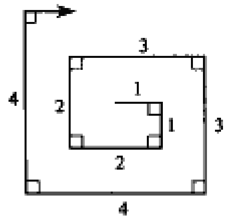


(A)38　(B)39　(C)54
(D)55　(E)30

20. 两个自然数 p 和 q,其个位数均不为零。任何 p 和 q 的乘积都是10的乘方(即是10,100,1 000,10 000,……)。如果 $p>q$,$p-q$ 的个位数不可能是下列哪个数?

(A)1　(B)3　(C)5
(D)7　(E)9

19. On a large piece of paper, Dana creates a "rectangular spiral" by drawing line segments of lengths, in cm, of 1, 1, 2, 2, 3, 3, 4, 4, … as shown. Dana's pen runs out of ink after the total of all the lengths he has drawn is 3 000 cm. What is the length of the longest line segment that Dana draws?



(A)38　(B)39　(C)54
(D)55　(E)30

20. Two natural numbers, p and q, do not end in zero. The product of any pair, p and q, is a power of 10 (that is, 10, 100, 1 000, 10 000, …). If $p>q$, the last digit of $p-q$ cannot be

(A)1　(B)3　(C)5
(D)7　(E)9

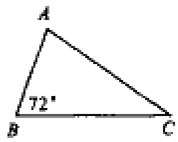
试卷十二

Test 12

1. 下列哪个数是奇数?

(A)6^2　(B)$23-17$　(C)9×24　(D)$96\div8$　(E)9×41

2. 在$\triangle ABC$中,$\angle B=72^\circ$。另外两个角的度数之和是多少度?



(A)144°　(B)72°　(C)108°　(D)110°　(E)288°

3. 将数字$\frac{4}{5}$,81%和0.801由小至大排列,正确的排序是哪一个?

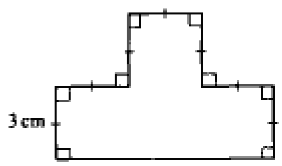
(A)$\frac{4}{5}$,81%,0.801　(B)81%,0.801,$\frac{4}{5}$　(C)0.801,$\frac{4}{5}$,81%　(D)81%,$\frac{4}{5}$,0.801　(E)$\frac{4}{5}$,0.801,81%

4. 10,4,8,7和6的平均值是多少?

(A)33　(B)13　(C)35　(D)10　(E)7

5. 如图所示,线段都相交成90°。若较短的线段都为3厘米,问图形的面积是多少?

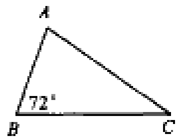
(A)30　(B)36　(C)40　(D)45　(E)54



1. Which one of the following gives an odd integer?

(A)6^2　(B)$23-17$　(C)9×24　(D)$96\div8$　(E)9×41

2. In $\triangle ABC$, $\angle B=72^\circ$. What is the sum, in degrees, of the other two angles?



(A)144°　(B)72°　(C)108°　(D)110°　(E)288°

3. If the numbers $\frac{4}{5}$, 81% and 0.801 are arranged from smallest to largest, the correct order is

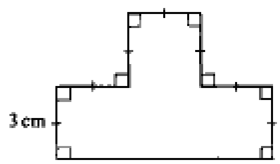
(A)$\frac{4}{5}$,81%,0.801　(B)81%,0.801,$\frac{4}{5}$　(C)0.801,$\frac{4}{5}$,81%　(D)81%,$\frac{4}{5}$,0.801　(E)$\frac{4}{5}$,0.801,81%

4. The average of 10,4,8,7,and 6 is

(A)33　(B)13　(C)35　(D)10　(E)7

5. In the diagram, line segments meet at 90° as shown. If the short line segments are each 3 cm long, what is the area of the shape?

(A)30　(B)36　(C)40　(D)45　(E)54



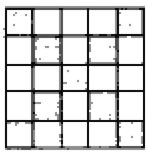
6. 一个长方形房间的地板用正方形的地面砖覆盖。这一房间有 10 个地面砖长，5 个地面砖宽。问一共有多少地面砖与墙体相邻？

(A)26　　(B)30
(C)34　　(D)46
(E)50

7. 弗雷德、吉尔、亨利、义格和琼 5 个同学按这一顺序围坐在圆桌旁。为决定谁第一个参加游戏，他们进行"倒数"。亨利开始说"34"，义格则说"33"。问按这一顺序下去谁会数到"1"？

(A)弗雷德　　(B)吉尔
(C)亨利　　(D)义格
(E)琼

8. 如图所示，阴影部分的小方格为所有方格的百分之几？



(A)9　　(B)33
(C)36　　(D)56.25
(E)64

9. 下列哪个数是奇数、有数字 5、可以被 3 整除，并且介于 12^2 与 13^2 之间。

(A)105　　(B)147
(C)156　　(D)165
(E)175

10. 一个盒子中有同样大小的 36 个粉色方块、18 个蓝色方块、9 个绿色方块、6 个红色方块、3 个紫色方块。任意挑一个方块，是绿色的概率有多大？

(A)$\frac{1}{9}$　　(B)$\frac{1}{8}$
(C)$\frac{1}{5}$　　(D)$\frac{1}{4}$
(E)$\frac{9}{70}$

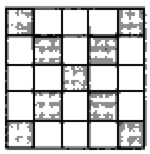
6. The floor of a rectangular room is covered with square tiles. The room is 10tiles long and 5 tiles wide. The number of tiles that touch the walls of the room is

(A)26　　(B)30
(C)34　　(D)46
(E)50

7. Five students named Fred, Gail, Henry, Iggy, and Joan are seated around a circular table in that order. To decide who goes first in a game, they play "countdown". Henry starts by saying "34", with Iggy saying "33". If they continue to count down in their circular order, who will eventually say "1"?

(A)Fred　　(B)Gail
(C)Henry　　(D)Iggy
(E)Joan

8. In the diagram, the percentage of small squares that are shaded is



(A)9　　(B)33
(C)36　　(D)56.25
(E)64

9. Which of the following numbers is an odd integer, contains the digit 5, is divisible by 3, and lies between 12^2 and 13^2?

(A)105　　(B)147
(C)156　　(D)165
(E)175

10. A box contains 36 pink, 18 blue, 9 green, 6 red, and 3 purple cubes that are identical in size. If a cube is selected at random, what is the probability that it is green?

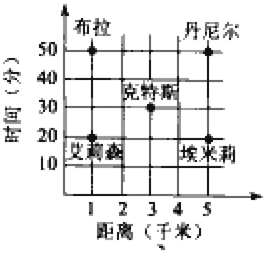
(A)$\frac{1}{9}$　　(B)$\frac{1}{8}$
(C)$\frac{1}{5}$　　(D)$\frac{1}{4}$
(E)$\frac{9}{70}$

11. 下边的图表显示 5 个人步行的距离和花费的时间，按平均值计算，哪一个人走得最快？

(A)艾莉森　　(B)布拉

(C)克特斯　　(D)丹尼尔

(E)埃米莉



12. 在斐波纳契数列中，第三项是前面两项的和。若数列的第一项为 2，第三项为 9，问第 8 项是多少？

(A)34　　(B)36

(C)107　　(D)152

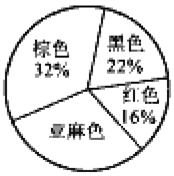
(E)245

13. 将调查 600 人头发颜色的结果列在图示圆形中。问有多少人是亚麻色的头发？

(A)30　　(B)160

(C)180　　(D)200

(E)420



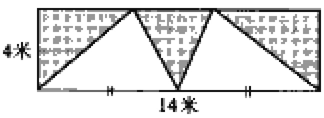
头发的颜色

14. 长方形中阴影部分的面积是多少平方米？

(A)14　　(B)28

(C)33.6　　(D)56

(E)42

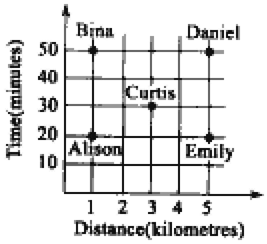


11. The graph shown at the right indicates the time taken by five people to travel various distances. On average, which person travelled the fastest?

(A)Alison　　(B)Bina

(C)Curtis　　(D)Daniel

(E)Emily



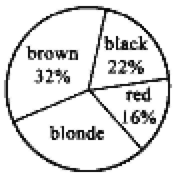
12. In a "Fibonacci" sequence of numbers, each term beginning with the third, is the sum of the previous two terms. The first number in such a sequence is 2 and the third is 9. What is the eighth term in the sequence?

(A)34　　(B)36

(C)107　　(D)152

(E)245

13. The results of a survey of the hair colour of 600 people are shown in this circle graph. How many people have blonde hair?



Hair Colour

(A)30　　(B)160

(C)180　　(D)200

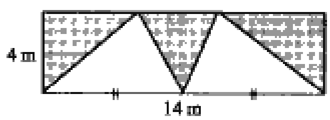
(E)420

14. What is the area, in m^2, of the shaded part of the rectangle?

(A)14　　(B)28

(C)33.6　　(D)56

(E)42



15. 将前 9 个正奇数放在魔力方格中，并且使横向、纵向和对角线方向数字和相等。问 $A+E$ 是多少？

A	1	B
5	C	13
D	E	3

(A)32　(B)28　(C)26
(D)24　(E)16

16. 在所示的板上玩一种游戏。在这种游戏中，游戏者可以向上、下、左、右任何方向移动三格，然后再在垂直方向上移动两格。如果游戏者从 S 点开始，并按规定的方法走，板上的哪一位置(P、Q、R、T 或 W)他不能到达？

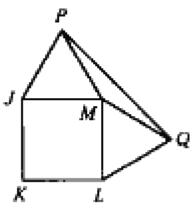
		P		
	Q		R	
		T		
S				W

(A)P　(B)Q　(C)R
(D)T　(E)W

17. 将 42 个边长为 1 厘米的小方块粘在一起形成一个立体的矩形块。若矩形块底面的周长为 18 厘米，问矩形块的高是多少厘米？

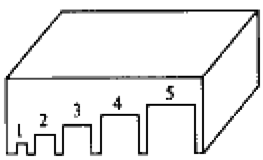
(A)1　(B)2　(C)$\frac{7}{3}$
(D)3　(E)4

18. $JKLM$ 是一正方形。P 和 Q 是正方形外的两点，并且 $\triangle JMP$ 和 $\triangle MLQ$ 都是全等三角形。问 $\angle PQM$ 的度数是多少？



(A)10°　(B)15°　(C)25°
(D)30°　(E)150°

19. 在盒子的一边切有 5 个逐渐增大的洞。洞上的数字表示玻璃球通过一次所得到的分数。有小、中、大三种



15. The first 9 positive odd integers are placed in the magic square so that the sum of the numbers in each row, column and diagonal are equal. Find the value of $A+E$.

A	1	B
5	C	13
D	E	3

(A)32　(B)28　(C)26
(D)24　(E)16

16. A game is played on the board shown. In this game, a player can move three places in any direction (up, down, right or left) and then can move two places in a direction perpendicular to the first move. If a player starts at S, which position on the board (P, Q, R, T, or W) cannot be reached through any sequence of moves?

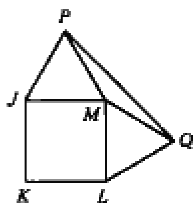
		P		
	Q		R	
		T		
S				W

(A)P　(B)Q　(C)R
(D)T　(E)W

17. Forty-two cubes with 1 cm edges are glued together to form a solid rectangular block. If the perimeter of the base of the block is 18 cm, then the height, in cm, is

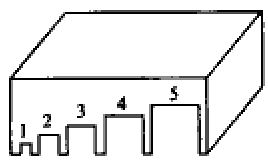
(A)1　(B)2　(C)$\frac{7}{3}$
(D)3　(E)4

18. $JKLM$ is a square. Points P and Q are outside the square such that triangles JMP and MLQ are both equilateral. The size, in degrees, of angle PQM is



(A)10°　(B)15°　(C)25°
(D)30°　(E)150°

19. Five holes of increasing size are cut along the edge of one face of a box as shown. The number of points scored when a



不同尺寸的玻璃球。小球可以通过任一个洞，中球可以通过数字为 3、4、5 的洞，大球仅可通过数字为 5 的洞。你可选不同尺寸的 10 个球投到洞中。若积分为 23 分，问你最多已经投到洞中多少球？

(A)12 (B)13 (C)14
(D)15 (E)16

marble is rolled through that hole is the number above the hole. There are three sizes of marbles: small, medium and large. The small marbles fit through any of the holes, the medium fit only through holes 3, 4 and 5 and uhe large fit only through hole 5. You may choose up to 10 marbles of each size to roll and every rolled marble goes through a hole. For a score of 23, what is the maximum number of marbles that could have been rolled?

(A)12 (B)13 (C)14
(D)15 (E)16

20. 在垒球比赛中，每个队都与其他队交锋 4 场，这时的总积分为：狮子队 22 分，老虎队 19 分，骑警队 14 分，皇家队 12 分。若赢 1 场得 3 分，平 1 场得 1 分，输 1 场不得分，问有多少场比赛为平局？

(A)3 (B)4 (C)5
(D)7 (E)10

20. In a softball league, after each team has played every other team 4 times, the total accumulated points are : Lions22, Tigers 19, Mounties 14, and Royals 12. If each team received 3 points for a win, 1 point for a tie and no points for a loss, how many games ended in a tie?

(A)3 (B)4 (C)5
(D)7 (E)10

试卷十三

Test 13

1. $\frac{9}{10}+\frac{8}{100}$用小数表示是多少？

   (A)1.098　(B)0.98　(C)0.098　(D)0.090 8　(E)9.8

2. 下列哪一个整数与 $7\times\frac{3}{4}$ 最接近？

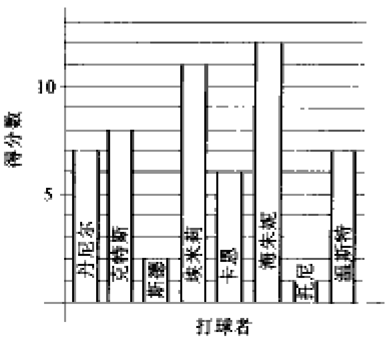
   (A)21　(B)9　(C)6　(D)5　(E)1

3. 一个数除以 7 时，它的商为 4，余数为 6，问这个数是多少？

   (A)17　(B)168　(C)34　(D)31　(E)46

4. 图表显示 8 名选手在最后一场篮球比赛中的得分情况。问总分一共是多少？

   (A)54　(B)8　(C)12　(D)58　(E)46



1. As a decimal, $\frac{9}{10}+\frac{8}{100}$ is

   (A)1.098　(B)0.98　(C)0.098　(D)0.090 8　(E)9.8

2. What integer is closest in value to $7\times\frac{3}{4}$?

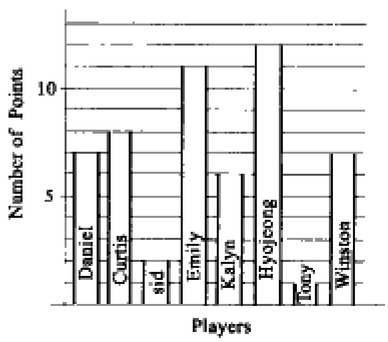
   (A)21　(B)9　(C)6　(D)5　(E)1

3. When a number is divided by 7, it gives a quotient of 4 with a remainder of 6. What is the number?

   (A)17　(B)168　(C)34　(D)31　(E)46

4. The graph shows the complete scoring summary for the last game played by the eight players on basketball team. The total number of points scored was

   (A)54　(B)8　(C)12　(D)58　(E)46



5. 若 x 的$\frac{1}{2}$是 32,问 $2x$ 是多少?

(A)128　(B)64　(C)32

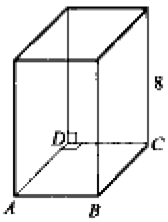
(D)256　(E)16

6. 3个连续整数的和是 90。问三个数中最大的整数是多少?

(A)28　(B)29　(C)31

(D)32　(E)21

7. 如图所示,一长方形建筑方块有一正方形的底面 $ABCD$,若长方形的高为 8 个单位,体积为 288 个立方单位,问正方形底面的边长是多少?



(A)6　(B)8

(C)36　(D)10

(E)12

8. 一菜谱要用 25 毫升黄油和 125 毫升糖。如果已用了 1 000 毫升糖,问需要用多少黄油?

(A)100 毫升　(B)500 毫升

(C)200 毫升　(D)3 升

(E)400 毫升

9. 卡尔的薪金减少了 10%。以后他得到提升,薪金又增加了 10%。他原来的薪金是 20 000 美元,问现在的薪金是多少美元?

(A)16 200 美元　(B)19 800 美元

(C)20 000 美元　(D)20 500 美元

(E)24 000 美元

10. 使方格中横向,纵向和对角线方向的数字和都为 12。问 4 个角上的数字和是多少?

		4
	4	
	3	

(A)14　(B)15

(C)16　(D)17

(E)12

11. 保罗、奇斯、瑞切利、圣锐达和托尼 5 人坐在一桌子旁。奇斯坐在保罗与圣锐达之间。托尼不

5. If $\frac{1}{2}$ of the number represented by x is 32, what is $2x$?

(A)128　(B)64　(C)32

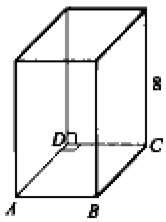
(D)256　(E)16

6. The sum of three consecutive integers is 90. What is the largest of the three integers?

(A)28　(B)29　(C)31

(D)32　(E)21

7. A rectangular building block has a square base $ABCD$ as shown. Its height is 8 units. If the block has a volume of 288 cubic units, what is the side length of the base?



(A)6　(B)8　(C)36

(D)10　(E)12

8. A recipe requires 25mL of butter to be used along with 125mL of sugar. If 1 000 mL of sugar is used, how much butter would be required?

(A)100 mL　(B)500 mL

(C)200 mL　(D)3 L

(E)400 mL

9. Karl had his salary reduced by 10%, He was later promoted and his salary was increased by 10%. If his original salary was \$20 000, what is his present salary?

(A) \$16 200　(B) \$19 800

(C) \$20 000　(D) \$20 500

(E) \$24 000

10. In the diagram, all rows, columns and diagonals have the sum 12. What is the sum of the four corner numbers?

		4
	4	
	3	

(A)14　(B)15

(C)16　(D)17

(E)12

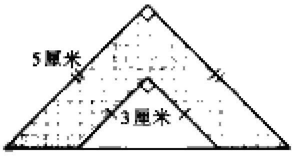
11. Paul, Quincy, Rochelle, Surinder, and Tony are sitting around a table. Quincy sits in the chair

在圣锐达旁边。问在托尼两边坐的是哪两位？
(A)保罗和瑞切利 (B)奇斯和瑞切利
(C)保罗和奇斯 (D)圣锐达和奇斯
(E)不可能知道

12. 正方形 $ABCD$ 是由 2 个相同的长方形，1 个面积为 4 平方厘米的正方形和一个面积为 16 平方厘米的正方形组成。问正方形 $ABCD$ 的面积是多少平方厘米？
(A)64 (B)49 (C)25
(D)36 (E)20

13. 2000 年 4 月有 5 个星期天。有 3 个星期天是在这个月的双号。问这个月的第 8 天是星期几？
(A)星期六 (B)星期天 (C)星期一
(D)星期二 (E)星期五

14. 图中示有两个直角等腰三角形。问阴影部分的面积是多少？
(A)4.5 平方厘米 (B)8 平方厘米
(D)16 平方厘米 (C)12.5 平方厘米
(E)17 平方厘米



15. 一肉铺老板不诚实。每千克肉标价 3.79 美元，实际售价 4.00 美元。在售出 1 800 千克肉后被发现，并被罚款 500 美元。问这时他的收入有什么影响？
(A)损失了 478 美元 (B)损失了 122 美元
(C)不赚不赔 (D)赚了 122 美元
(E)赚了 478 美元

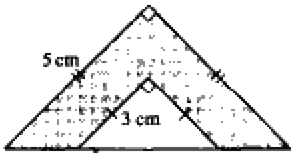
16. 在投篮比赛中，每个选手投 10 个球，球上的数

between Paul and Surinder. Tony is not beside Surinder. Who is sitting on either side of Tony?
(A)Paul and Rochelle (B)Quincy and Rochelle
(C)Paul and Quincy (D)Surinder and Quincy
(E)Not possible to tell

12. $ABCD$ is a square that is made up of two identical rectangles and two squares of area 4 cm^2 and 16 cm^2. What is the area , in cm^2, of the square $ABCD$?
(A)64 (B)49 (C)25
(D)36 (E)20

13. The month of April, 2000, had five Sundays. Three of them fall on even numbered days. The eighth day of this month is a
(A)Saturday (B)Sunday (C)Monday
(D)Tuesday (E)Friday

14. The diagram shows two isosceles right-triangles with sides as marked. What is the area of the shaded region?
(A)4.5 cm^2 (B)8 cm^2 (C)12.5 cm^2
(D)16 cm^2 (E)17 cm^2



15. A dishonest butcher priced his meat so that meat advertised at \$3.79 per kg was actually sold for \$4.00 per kg. He sole 1 800 kg of meat before being caught and fined \$500. By how much was he ahead or behind where he would have been had he not cheated?
(A) \$478 loss (B) \$122 loss
(C)Breaks even (D) \$122 gain
(E) \$478 gain

16. In a basketball shooting competition, each competitor

字也是从 1 到 10，投中篮的得分等于球上的数字。若一选手有两球未中，问其总分不可能是下列哪一个值？

(A)52　(B)44　(C)41　(D)38　(E)35

17. 萨姆沿直线走向一高 8 米的电灯杆。当他离电灯杆 12 米远时，他的影子长 4 米。问他离电灯杆 8 米远时，他的影子是多长？

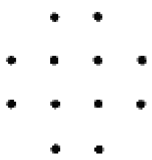
(A)$1\frac{1}{2}$米　(B)2 米　(C)$2\frac{1}{2}$米

(D)$2\frac{2}{3}$米　(E)3 米

18. 从小到大排列的一系列正方形面积的总和为 35 平方千米。最小的正方形边长为 500 米，下一个正方形的边长为 1 000 米 。正方形的边长按 500 米逐渐增加。问一共有多少个正方形？

(A)5　(B)6　(C)7　(D)8　(E)9

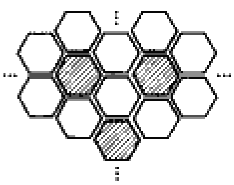
19. 如图所示，矩形的网络上有 12 个点。问连接 4 个点一共可形成多少个正方形？



(A)6　(B)7　(C)9

(D)11　(E)13

20. 如部分图示，一正方形地板上用正六边形砖铺面。砖有蓝色和白色两种。每 1 块蓝色的砖被 6 块白色的砖所包围，而每 1 块白色的砖则由其他 3 块白色的砖和 3 块蓝色的砖所包围。忽略切开的砖，问蓝色砖的数量与白色砖的数量比最接近多少？



(A)1:6　(B)2:3　(C)3:10　(D)1:4　(E)1:2

shoots ten balls which are numbered from 1 to 10. The number of points earned for each successful shot is equal to the number on the ball. If a competitor misses exactly two shots, which one of the following scores is not possible?

(A)52　(B)44　(C)41　(D)38　(E)35

17. Sam is walking in a straight line towards a lamp post which is 8 m high. When he is 12 m away from the lamp post, his shadow is 4 m in length. When he is 8 m from the lamp post, what is the length of his shadow?

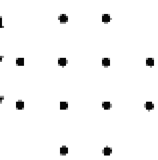
(A)$1\frac{1}{2}$ m　(B)2 m　(C)$2\frac{1}{2}$ m

(D)$2\frac{2}{3}$ m　(E)3 m

18. The total area of a set of different squares, arranged from smallest to largest, is 35 km^2. The smallest square has a side length of 500 m. The next larger square has a side length of 1 000 m. In the same way, each successive square has its side length increased by 500 m. What is the total number of squares?

(A)5　(B)6　(C)7　(D)8　(E)9

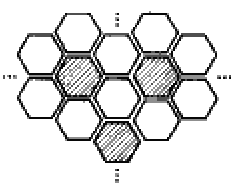
19. Twelve points are marked on a rectangular grid, as shown. How many squares can be formed by joining four of these points?



(A)6　(B)7　(C)9

(D)11　(E)13

20. A square floor is tiled, as partially shown, with a large number of regular hexagonal tiles. The tiles are coloured blue or white. Each blue tile is surrounded by 6 white tiles and each white tile is surrounded by 3 white and 3 blue tiles. Ignoring part tiles, the ratio of the number of blue tiles to the number of white tiles is closest to



(A)1:6　(B)2:3　(C)3:10　(D)1:4　(E)1:2

试卷十四

Test 14

1. 计算 0.001 + 1.01 + 0.11 的值。

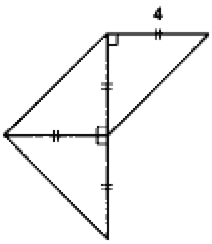
(A)1.111　(B)1.101　(C)1.013
(D)0.113　(E)1.121

2. 一坐标上有 40 个连续的整数。若最小的整数为 −11，问最大的整数是多少？

(A)29　(B)30　(C)28
(D)51　(E)50

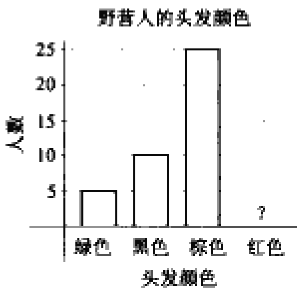
3. 图示的整个面积是多少？

(A)16　(B)32
(C)20　(D)24
(E)64



4. 条形图表显示的是所有野营人头发的颜色，但代表红色头发的条形不小心丢失了。若有 50% 的野营人是棕色的头发，问有多少野营人是红色的头发？

(A)5　(B)10　(C)25
(D)50　(E)60



1. The value of 0.001 + 1.01 + 0.11 is

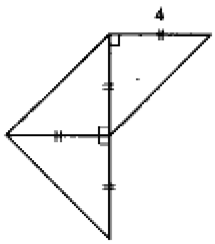
(A)1.111　(B)1.101　(C)1.013
(D)0.113　(E)1.121

2. A number line has 40 consecutive integers marked on it. If the smallest of these integers is − 11, what is the largest?

(A)29　(B)30　(C)28
(D)51　(E)50

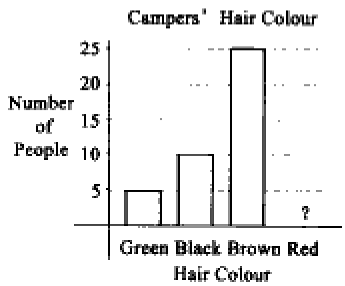
3. The area of the entire figure shown is

(A)16　(B)32
(C)20　(D)24
(E)64



4. The bar graph shows the hair colours of the campers. The bar corresponding to redheads has been accidentally removed. If 50% of the campers have brown hair, how many of the campers have red hair?

(A)5　(B)10　(C)25
(D)50　(E)60



5. 亨利在前 3 场篮球比赛中总得分为 20 分。其中 $\frac{1}{2}$ 是在第 1 场得到的，有 $\frac{1}{10}$ 是在第 2 场得到的。问他在第 3 场得分是多少？

(A)2　(B)10　(C)11
(D)12　(E)8

6. 用方木块做成的一骰子各面上标的数字为 1，1，1，2，3 和 3。若投一次骰子，显示奇数的概率是多少？

(A) $\frac{5}{6}$　(B) $\frac{4}{6}$　(C) $\frac{3}{6}$
(D) $\frac{2}{6}$　(E) $\frac{1}{6}$

7. 宠物展上大狗的数量与小狗的数量之比为 3:17。宠物展上一共有 80 只狗，问有多少只大狗？

(A)12　(B)68　(C)20
(D)24　(E)6

8. 两个数的乘积是 24，问任意这两个数的和的最小值是多少？

(A)9　(B)10　(C)11
(D)14　(E)25

9. 在图示的方格中，横向、纵向及对角线方向上的数字相乘都得出同样的结果。问两个空格中数字和是多少？

12	1	18
9	6	4
		3

(A)28　(B)15　(C)30
(D)38　(E)72

10. 一个质数初称为“超质数”。若将这一质数加倍后再减去 1，其结果又是另一个质数。问小于 15 的超质数一共有多少个？

(A)2　(B)3　(C)4
(D)5　(E)6

5. Henri scored a total of 20 points in his basketball team's first three games. He scored $\frac{1}{2}$ of these points in the first game and $\frac{1}{10}$ of these points in the second game. How many points did he score in the third game?

(A)2　(B)10　(C)11
(D)12　(E)8

6. A fair die is constructed by labelling the faces of a wooden cube with the numbers 1, 1, 1, 2, 3, and 3. If this die is rolled once, the probability of rolling an odd number is

(A) $\frac{5}{6}$　(B) $\frac{4}{6}$　(C) $\frac{3}{6}$
(D) $\frac{2}{6}$　(E) $\frac{1}{6}$

7. The ratio of the number of big dogs to the number of small dogs at a pet show is 3:17. There are 80 dogs, in total, at this pet show. How many big dogs are there?

(A)12　(B)68　(C)20
(D)24　(E)6

8. The product of two whole numbers is 24. The smallest possible sum of these two numbers is

(A)9　(B)10　(C)11
(D)14　(E)25

9. In the square shown, the numbers in each row, column, and diagonal multiply to give the same result. The sum of the two missing numbers is

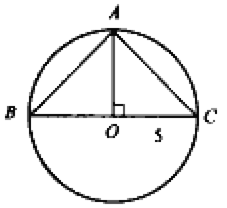
12	1	18
9	6	4
		3

(A)28　(B)15　(C)30
(D)38　(E)72

10. A prime number is called a "Superprime" if doubling it, and then subtracting 1, results in another prime number. The number of Superprimes less than 15 is

(A)2　(B)3　(C)4
(D)5　(E)6

11. 如图所示，BC 是以 O 为圆心的圆的直径，圆的半径为 5。A 是圆周上的一点，AO 垂直于 BC。问 $\triangle ABC$ 的面积是多少？



(A)6.25　(B)12.5
(C)25　(D)37.5
(E)50

12. 一个长方形标志牌的尺寸为 9 米×16 米，标志牌上印有一正方形广告，正方形广告的四周应至少留 1.5 米宽。问最大的广告面积是多少？
(A)78 平方米　(B)144 平方米　(C)36 平方米
(D)9 平方米　(E)56.25 平方米

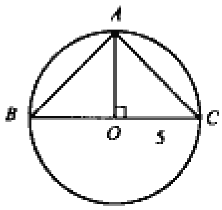
13. 弗利克斯将 924 美元兑换成法郎以便去法国旅行。这时每 1 法郎值 30 美分。若他返回时还带有 21 法郎，问他一共花了多少法郎？
(A)3 080　(B)3 101　(C)256.2
(D)3 059　(E)298.2

14. 6×4 的长方形砖要铺成一正方形，并且不能重叠，问至少需要多少块砖？
(A)8　(B)24　(C)4　(D)12　(E)6

15. 安妮、贝丝和克里斯三人分 10 块糖。安妮至少分 3 块，贝丝和克里斯至少分 2 块。如果克里斯最多分 3 块，贝丝可能分多少块糖？
(A)2　(B)2 或 3　(C)3 或 4
(D)2，3 或 5　(E)2，3，4 或 5

16. 劳克记录了 9 次考试，均为百分制。他的 9 次考试的平均成绩为 68%。若把他的最低成绩取消掉，问他可能的最高平均成绩是多少？
(A)76.5%　(B)70%　(C)60.4%
(D)77%　(E)76%

11. BC is a diameter of the circle with centre O and radius 5, as shown. If A lies on the circle and AO is perpendicular to BC, the area of triangle ABC is



(A)6.25　(B)12.5
(C)25　(D)37.5
(E)50

12. A rectangular sign that has dimensions 9 m by 16 m has a square advertisement painted on it. The border around the square is required to be at least 1.5 m wide. The area of the largest square advertisement that can be painted on the sign is
(A)78 m^2　(B)144 m^2　(C)36 m^2
(D)9 m^2　(E)56.25 m^2

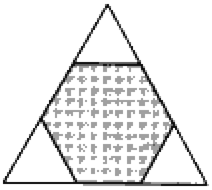
13. Felix converted \$924.00 to francs before his trip to France. At that time, each franc was worth thirty cents. If he returned from his trip with 21 francs, how many francs did he spend?
(A)3 080　(B)3 101　(C)256.2
(D)3 059　(E)298.2

14. Rectangular tiles, which measure 6 by 4, are arranged without overlapping, to create a square. The minimum number of these tiles needed to make a square is
(A)8　(B)24　(C)4　(D)12　(E)6

15. Anne, Beth and Chris have 10 candies to divide amongst themselves. Anne gets at least 3 candies, while Beth and Chris each get at least 2. If Chris gets at most 3, the number of candies that Beth could get is
(A)2　(B)2 or 3　(C)3 or 4
(D)2, 3 or 5　(E)2, 3, 4 or 5

16. Naoki wrote nine tests, each out of 100. His average on these nine tests is 68%. If his lowest mark is omitted, what is his highest possible resulting average?
(A)76.5%　(B)70%　(C)60.4%
(D)77%　(E)76%

17. 如图所示,一个正多边形与一全等三角形内接。若六边形的面积为 12,问三角形的面积是多少?



(A)20 (B)16
(C)15 (D)18
(E)24

18. 卡瑞莱 10 秒跑 100 米。桑加 44 秒跑 400 米。他们俩人各用自的速度参加 1 千米比赛。问跑完全程时胜者会领先约多少米?

(A)100 米 (B)110 米 (C)95 米
(D)90 米 (E)91 米

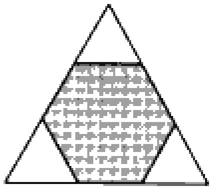
19. 艾珠在两个鱼缸中养一些鱼。在第一个鱼缸中虹鳉鱼与金鱼的比例为 2:3,在第二个鱼缸中的比例为 3:5。如果艾珠共有 20 条虹鳉鱼,问他至少有多少条金鱼?

(A)29 (B)30 (C)31
(D)32 (E)33

20. 用长度分别为 4,5 和 8 的三个边可构成--个三角形,但用长度分别为 4,5 和 9 的三个边就不能构成三角形。罗恩有 8 根棍,其长度均为整数。他发现用这 8 根棍中的任何 3 根都不能构成三角形。问这 8 根棍中最长棍的可能最小长度是多少?

(A)20 (B)21 (C)22
(D)23 (E)24

17. A regular hexagon is inscribed in an equilateral triangle, as shown. If the hexagon has an area of 12, the area of this triangle is



(A)20 (B)16
(C)15 (D)18
(E)24

18. Catrina runs 100 m in 10 seconds. Sedra runs 400 m in 44 seconds. Maintaining these constant speeds, they participate in a 1 km race. How far ahead, to the nearest metre, is the winner as the crosses the finish line?

(A)100 m (B)110 m (C)95 m
(D)90 m (E)91 m

19. Enzo has fish in two aquariums. In one aquarium, the ratio of the number of guppies to the number of goldfish is 2:3. In the other, this ratio is 3:5. If Enzo has 20 guppies in total, the least number of goldfish that he could have is

(A)29 (B)30 (C)31
(D)32 (E)33

20. A triangle can be formed having side lengths 4, 5 and 8. It is impossible, however, to construct a triangle with side lengths 4, 5 and 9. Ron has eight sticks, each having an integer length. He observes that he cannot form a triangle using any three of these sticks as side lengths. The shortest possible length of the longest of the eight sticks is

(A)20 (B)21 (C)22
(D)23 (E)24

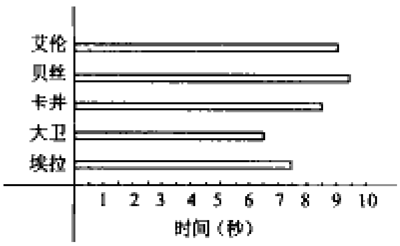
试卷十五

Test 15

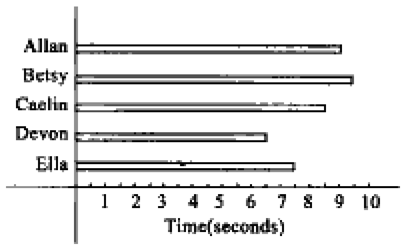
1. 唐娜帮助看小孩每小时挣 5 美元，每周看小孩 7 个小时。若她在银行账户上有存款 20 美元，再将一周的收入存入，并且不取出任何钱，问一周后她的账户上的存款是多少钱？
   (A)35 美元　(B)20 美元　(C)45 美元
   (D)55 美元　(E)65 美元

1. Tyesha earns \$5 per hour babysitting, and babysits for 7 hours in a particular week. If she starts the week with \$20 in her bank account, deposits all she earns into her account, and does not withdraw any money, the amount she has in her account at the end of the week is
   (A) \$35　(B) \$20　(C) \$45
   (D) \$55　(E) \$65

2. 5 只老鼠进行 25 米赛跑。图表显示了每只老鼠完成比赛的时间，问哪只老鼠赢得了比赛？
   (A)艾伦　(B)贝丝
   (C)卡井　(D)大卫
   (E)埃拉



2. Five rats competed in a 25 metre race. The graph shows the time that each rat took to complete the race. Which rat won the race?
   (A)Allan　(B)Betsy
   (C)Caelin　(D)Devon
   (E)Ella



3. 数字 12，14，16 和 18 的平均值是多少？
   (A)30　(B)60　(C)17
   (D)13　(E)15

3. The mean(average) of the numbers 12, 14, 16, and 18 is
   (A)30　(B)60　(C)17
   (D)13　(E)15

4. 若 $P=1, Q=2$，下列哪一个表达式不是整数？
   (A)$P+Q$　(B)$P\times Q$
   (C)$\frac{P}{Q}$　(D)$\frac{Q}{P}$
   (E)P^Q

4. If $P=1$ and $Q=2$, which of the following expressions is not equal to an integer?
   (A)$P+Q$　(B)$P\times Q$
   (C)$\frac{P}{Q}$　(D)$\frac{Q}{P}$
   (E)P^Q

5. 4个朋友均分聚会后留下的$\frac{3}{4}$个比萨饼。问每个人能得到整个比萨饼的几分之几？

(A)$\frac{3}{8}$　(B)$\frac{3}{16}$

(C)$\frac{1}{12}$　(D)$\frac{1}{16}$

(E)$\frac{1}{8}$

6. 两个面积都为25平方厘米的正方形的两边相连，形成一长方形。问长方形的周长是多少？

(A)30厘米　(B)25厘米

(C)50厘米　(D)20厘米

(E)15厘米

7. 查大迈比杰克大6岁，杰克比道格小3岁。如果查大迈是19岁，问道格是多少岁？

(A)17　(B)16

(C)10　(D)18

(E)15

8. 回文数字是一正整数，它从前看或从后看的值相等。例如2 002就是一个回文数字。下列哪一个最小的数加上2 002后又形成一个回文数字？

(A)11　(B)110

(C)108　(D)18

(E)1 001

9. 字母表上前6个字母分别用数字表示，而$A=1$，$B=2$，$C=3$，$D=4$，$E=5$和$F=6$，一个英文字的数位由这些字母的数值相加而成。例如*BEEF*的值是$2+5+5+6=18$。问下列哪一个英文字数值最大？

(A)*BEEF*　(B)*FADE*

(C)*FEED*　(D)*FACE*

(E)*DEAF*

5. Four friends equally shared $\frac{3}{4}$ of a pizza, which was left over after a party. What fraction of a whole pizza did each friend get?

(A)$\frac{3}{8}$　(B)$\frac{3}{16}$

(C)$\frac{1}{12}$　(D)$\frac{1}{16}$

(E)$\frac{1}{8}$

6. Two squares, each with an area of 25 cm^2, are placed side by side to form a rectangle. What is the perimeter of this rectangle?

(A)30 cm　(B)25 cm

(C)50 cm　(D)20 cm

(E)15 cm

7. Qaddama is 6 years older than Jack. Jack is 3 years younger than Doug. If Qaddama is 19 years old, how old is Doug?

(A)17　(B)16

(C)10　(D)18

(E)15

8. A palindrome is a positive integer whose digits are the same when read forwards or backwards. For example, 2 002 is a palindrome. What is the smallest number which can be added to 2 002 to produce a larger palindrome?

(A)11　(B)110

(C)108　(D)18

(E)1 001

9. The first six letters of the alphabet are assigned values $A=1$, $B=2$, $C=3$, $D=4$, $E=5$, and $F=6$. The value of a word equals the sum of the values of its letters. For example, the value of *BEEF* is $2+5+5+6=18$. Which of the following words has the greatest value?

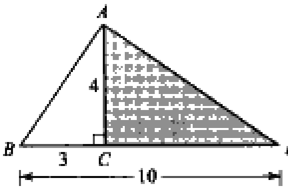
(A)*BEEF*　(B)*FADE*

(C)*FEED*　(D)*FACE*

(E)*DEAF*

10. 图中 $AC=4$，$BC=3$，$BD=10$，问阴影部分三角形的面积是多少？

(A)14　　(B)20
(C)28　　(D)25
(E)12



11. 在下列方程中字母 a，b，c 代表不同的数。

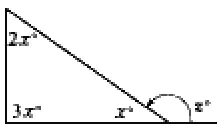
$1^3=1, a^3=1+7, 3^3=1+7+b, 4^3=1+7+c$

计算 $a+b+c$ 的值。

(A)58　　(B)110
(C)75　　(D)77
(E)79

12. 问图中 $\angle z$ 是多少度？

(A)150　　(B)180
(C)60　　(D)90
(E)120



13. 完全数为一整数，等于除自身以外的除数之和。例如 28 就是一完全数因为 $28=1+2+4+7+14$。问下列哪一个数是完全数？

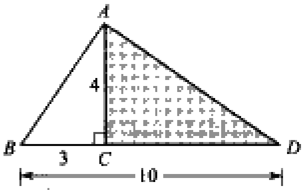
(A)10　　(B)13　　(C)6
(D)8　　(E)9

14. 苏贝丝在她的数学本上记下了达维拉的电话号码。这一天在检查家庭作业时她不小心擦掉了电话号码的最后 2 个数，即成为 893－44－－。苏贝丝试图拨打达维拉的电话。最初的 5 个数是 893－44。问苏贝丝至少要拨打多少个电话才能保证与达维拉联系上？

(A)100　　(B)90　　(C)10
(D)1 000　　(E)20

10. In the diagram, $AC=4$, $BC=3$, and $BD=10$. The area of the shaded triangle is

(A)14　　(B)20
(C)28　　(D)25
(E)12



11. In the following equations, the letters a, b and c represent different numbers.

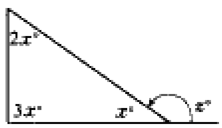
$1^3=1, a^3=1+7, 3^3=1+7+b, 4^3=1+7+c$

The numerical value of $a+b+c$ is

(A)58　　(B)110
(C)75　　(D)77
(E)79

12. In the diagram, the value of z is

(A)150　　(B)180
(C)60　　(D)90
(E)120



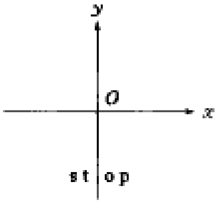
13. A perfect number is an integer that is equal to the sum of all of its positive divisors, except itself. For example, 28 is a perfect number because $28=1+2+4+7+14$. Which of the following is a perfect number?

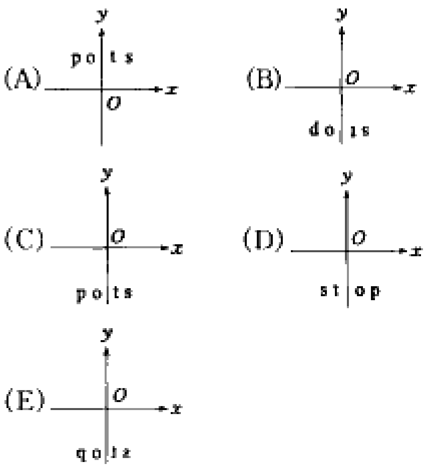
(A)10　　(B)13　　(C)6
(D)8　　(E)9

14. Subesha wrote down Davina's phone number in her math binder. Later that day, while correcting her homework, Subesha accidentally erased the last two digits of the phone number, leaving 893－44－－. Subesha tries to call Davina by dialing phone numbers starting with 893－44. What is the least number of phone calls that she has to make to be guaranteed to reach Davina's house?

(A)100　　(B)90　　(C)10
(D)1 000　　(E)20

15. 图中有一英文字“stop”。这个字绕圆点 O 按顺时针方向转动180°,然后再反射到 x 轴的另一边。问这一结果是下列哪一个图形?



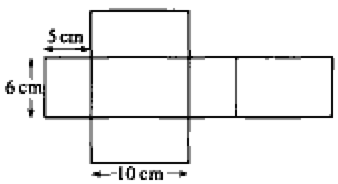


16. 5个人在房间里开会。会议结束后,每个人之间都握一次手。问一共握了多少次手?

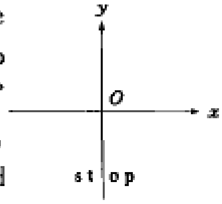
(A)5　　(B)10
(C)12　　(D)15
(E)25

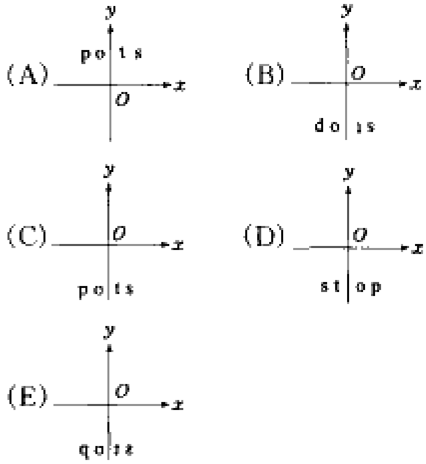
17. 所示的图可以被折成一矩形柱体。问柱体的表面积是多少平方厘米?

(A)312　　(B)300
(C)280　　(D)84
(E)600



15. The word “stop” starts in the position shown in the diagram to the right. It is then rotated 180° clockwise about the origin, O, and this result is then reflected in the x-axis. Which of the following represents the final image?



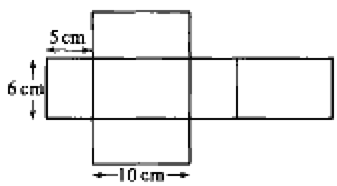


16. Five people are in a room for a meeting. When the meeting ends, each person shakes hands with each of the other people in the room exactly once. The total number of handshakes that occurs is

(A)5　　(B)10
(C)12　　(D)15
(E)25

17. The figure shown can be folded along the lines to form a rectangular prism. The surface area of the rectangular prism, in cm^2, is

(A)312　　(B)300
(C)280　　(D)84
(E)600



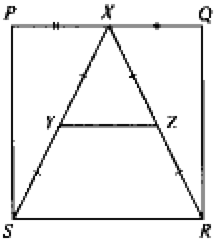
18. 马克有一个袋子，袋子中装有 3 个黑色的玻璃球，6 个金色的玻璃球，2 个紫色的玻璃球，6 个红色的玻璃球。马克又向袋子中加了一些白色的玻璃球，并且告诉苏珊她若任取一个球得到黑色或金色的概率是$\frac{3}{7}$。问马克向袋子中加了多少白色的球？

(A)5　(B)2　(C)6
(D)4　(E)3

18. Mark has a bag that contains 3 black marbles, 6 gold marbles, 2 purple marbles, and 6 red marbles. Mark adds a number of white marbles to the bag and tells Susan that if she now draws a marble at random from the bag, the probability of it being black or gold is $\frac{3}{7}$. The number of white marbles that Mark adds to the bag is

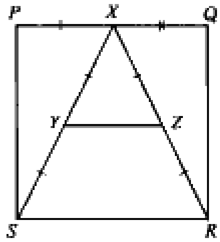
(A)5　(B)2　(C)6
(D)4　(E)3

19. 正方形 $PQRS$ 的边长为 8。X 是边 PQ 的中点，Y 和 Z 则分别是 XS 和 XR 的中点。问梯形 $YZRS$ 的面积是多少？



(A)24　(B)16
(C)20　(D)28
(E)32

19. $PQRS$ is a square with side length 8. X is the midpoint of side PQ, and Y and Z are the midpoints of XS and XR, respectively, as shown. The area of trapezoid $YZRS$ is



(A)24　(B)16
(C)20　(D)28
(E)32

20. 整数 226 和 318 三位上的数的乘积都是 24(注：$2\times2\times6$ 和 $3\times1\times8$)。问有多少个三位数的正整数其各位数的乘积为 24？

(A)4　(B)18　(C)24
(D)12　(E)21

20. Each of the integers 226 and 318 have digits whose product is 24. How many three-digit positive integers have digits whose product is 24?

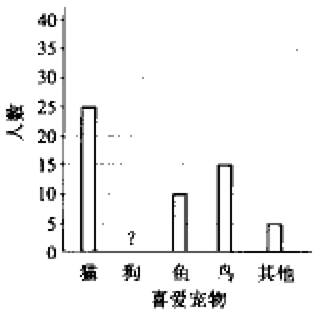
(A)4　(B)18　(C)24
(D)12　(E)21

试卷十六

Test 16

1. 在一项民意调查中，询问 90 个人"你们最喜欢的宠物是什么？"他们的回答显示在图表上，但在一图表上代表最喜欢狗的人数的长条被省去了。问有多少人选择的是狗作为他们最喜欢的宠物？

   (A)20　(B)55　(C)40
   (D)45　(E)35



2. 特拉维斯用发胶梳理头发。如果他每天用 4 毫升，问 128 毫升一瓶的发胶多少天用完？

   (A)32　(B)33　(C)40　(D)30　(E)28

3. 下列哪个算式可以使表达式$\frac{3\times6\times9}{3}=\frac{\square}{2}$成立？

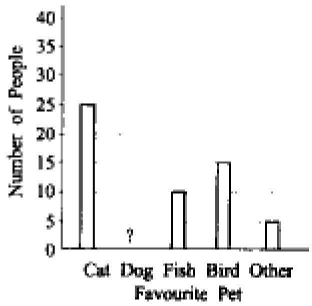
   (A)$2\times4\times6$　(B)$3\times4\times6$　(C)$2\times6\times9$
   (D)$2\times4\times8$　(E)$2\times12\times18$

4. 斯宾塞从学校步行回家，突然想起忘记带家庭作业，他又返回了学校，拿了家庭作业，然后回家。图表显示了不同时间他离家的距离。问他一共走了多少路才到家？

   (A)2 800 米　(B)1 000 米　(C)800 米
   (D)1 200 米　(E)1 400 米

1. In a survey, 90 people were asked "What is your favourite pet?" Their responses were recorded and then graphed. In the graph, the bar representing "favourite pet is dog" has been omitted. How many people selected a dog as their favourite pet?

   (A)20　(B)55　(C)40
   (D)45　(E)35



2. Travis spikes his hair using gel. If he uses 4 mL of gel every day, how many days will it take him to empty a 128 mL tube of gel?

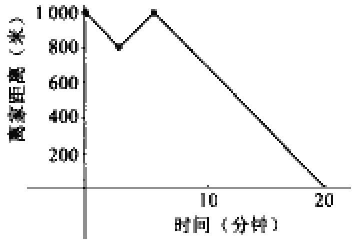
   (A)32　(B)33　(C)40　(D)30　(E)28

3. An expression that can be placed in the box to make the equation $\frac{3\times6\times9}{3}=\frac{\square}{2}$ true is

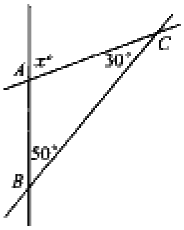
   (A)$2\times4\times6$　(B)$3\times4\times6$　(C)$2\times6\times9$
   (D)$2\times4\times8$　(E)$2\times12\times18$

4. Spencer was walking home from school when he realized he had forgotten his homework. He walked back to the school, picked up his homework and then walked home. The graph shows his distance from home at different times. In total, how far did he walk?

   (A)2 800 m　(B)1 000 m　(C)800 m
   (D)1 200 m　(E)1 400 m

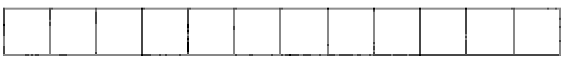


5. 如图所示，三条直线两两相交于点 A、B、C。若 $\angle ABC = 50^\circ$，$\angle ACB = 30^\circ$，问 x 是多少度？



(A)80°　　(B)30°
(C)100°　　(D)60°
(E)50°

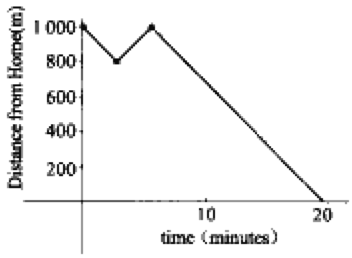
6. 若从图中 12 个小方块的 $\frac{2}{3}$ 中去除 $\frac{1}{2}$，问留下多少小方块？



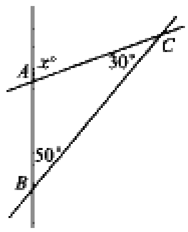
(A)2　(B)3　(C)4　(D)8　(E)9

7. 一个长方形场地的周长是其长度的 3 倍。若周长是 240 米，问场地的宽是多少米？
(A)80 米　(B)40 米　(C)20 米
(D)30 米　(E)120 米

8. 克里斯和帕特参加 30 千米比赛。他们俩人平常的速度是 10 千米/小时。如果比赛时克里斯的速度是他平常速度的 $\frac{1}{2}$，帕特的速度是她平常速度的 $1\frac{1}{2}$。问两人都跑完全程，克里斯要比帕特多花几个小时？
(A)1　(B)1.5　(C)2
(D)4　(E)6

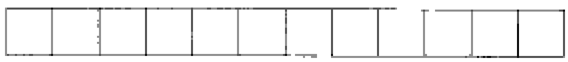


5. In the diagram, three lines meet at the points A, B and C. If $\angle ABC = 50^\circ$ and $\angle ACB = 30^\circ$, the value of x is



(A)80°　　(B)30°
(C)100°　　(D)60°
(E)50°

6. If $\frac{1}{2}$ of $\frac{2}{3}$ of the twelve small squares in the given figure are removed, how many squares remain?



(A)2　(B)3　(C)4　(D)8　(E)9

7. The perimeter of a rectangular field is 3 times its length. If the perimeter is 240 m, the width of the field is
(A)80 m　(B)40 m　(C)20 m
(D)30 m　(E)120 m

8. Chris and Pat go on a 30 km run. They both usually run at 10 km/h. If Chris runs at $\frac{1}{2}$ his usual running speed, and Pat runs at $1\frac{1}{2}$ times her usual speed, how many more hours does it take Chris to complete the run than it takes Pat to complete the run?
(A)1　(B)1.5　(C)2
(D)4　(E)6

9. 一个盒子中有 14 只光盘,光盘的颜色是红色的,蓝色的或绿色的。绿色的光盘是红色光盘的两倍,是蓝色光盘的一半。问有多少光盘是绿色的?

(A)2　(B)4　(C)6　(D)8　(E)10

10. 药瓶中装的几片维他命,药片有三种不同的形状,有 60 个正方形,60 个三角形和 60 个星形。每一种形状的药片又均分有三种不同的口味—草莓、葡萄和橘子型。若从一个刚打开的药瓶中随意取出一个药片,问药片是葡萄口味星形的概率是多大?

(A)$\frac{1}{9}$　(B)$\frac{1}{60}$　(C)$\frac{1}{20}$

(D)$\frac{1}{3}$　(E)$\frac{1}{180}$

11. $\triangle ABC$ 三个顶角的坐标分别为 $A(2,0)$,$B(6,0)$,$C(6,3)$。问三角形的面积是多少平方单位?

(A)3　(B)4　(C)6

(D)7　(E)12

12. 格井为商务旅行租了一汽车。租车公司的收费是 45 美元,另外每行驶 1 千米加 12 美分。若格井税前的账单是 74.16 美元,问他用这辆车行驶了多少千米?

(A)993　(B)375　(C)243

(D)288　(E)618

13. 如图,两个边长均为 5 厘米的正方形有部分重叠,重叠的部分也是一个正方形,并且面积为 4 平方厘米。问整个阴影图形的周长是多少厘米?



(A)24　(B)32　(C)40

(D)42　(E)50

9. A box contains 14 disks, each coloured red, blue or green. There are twice as many red disks as green disks, and half as many blue as green. How many disks are green?

(A)2　(B)4　(C)6　(D)8　(E)10

10. A bottle of children's vitamins contains tablets in three different shapes. Among the vitamins, there are 60 squares, 60 triangles and 60 stars. Each shape comes in an equal number of three different flavours-strawberry, grape and orange. A tablet is randomly chosen from a newly opened bottle. What is the probability that this tablet is a grape star?

(A)$\frac{1}{9}$　(B)$\frac{1}{60}$　(C)$\frac{1}{20}$

(D)$\frac{1}{3}$　(E)$\frac{1}{180}$

11. Triangle ABC has its vertices at $A(2,0)$, $B(6,0)$ and $C(6,3)$. The area of the triangle, in square units, is

(A)3　(B)4　(C)6

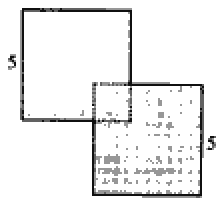
(D)7　(E)12

12. Genna rents a car for a business trip. The rental company charges a fee of \$45 plus 12 cents per kilometre driven. If Genna's bill before taxes is \$74.16, how many kilometres did she travel in the car?

(A)993　(B)375　(C)243

(D)288　(E)618

13. Two squares, each with side length 5 cm, overlap as shown. The shape of their overlap is a square, which has an area of 4 cm^2. What is the perimeter, in centimetres, of the shaded figure?



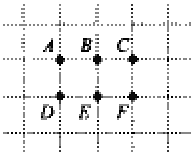
(A)24　(B)32　(C)40

(D)42　(E)50

14. 亚伯拉罕的数学考试有 30 个代数题和 50 个几何题，每题 1 分。他有 70%的代数题答对了，并且总分为 80%。问他答对了多少几何题？

(A)43　(B)45　(C)39
(D)41　(E)35

15. 如图所示，在一个正方形的网格上有 A、B、C、D、E 和 F6 个点。任意连接 3 个点，问可以得到多少不含直角的三角形？



(A)2　(B)1　(C)6
(D)0　(E)4

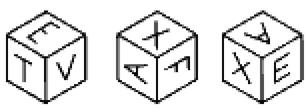
16. 一所大医院有 7 个手术室，10 个人在等待做 45 分钟的手术。第一个手术在早上 8 点开始，第二个手术在早上 8 点 15 分开始，并且以后的手术都相隔 15 分钟。问最后一个手术什么时候结束？

(A)上午 10 点 15 分　(B)上午 10 点 30 分
(C)上午 10 点 45 分　(D)上午 11 点整
(E)上午 11 点 15 分

17. 卢克已经进行了 20 场比赛，并且赢了 95%的比赛。若以后一场都不输，问他还需要赢多少场比赛，才能使赢场达到 96%？

(A)1　(B)3　(C)4
(D)5　(E)10

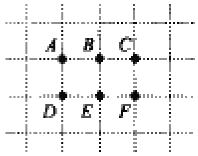
18. 在一个小立方块的每一面都喷刷一个不同的字母。图中显示了小方块的三个不同的位置。



14. Abraham's mathematics exam had 30 algebra questions and 50 geometry questions, each worth 1 mark. He got 70% of the algebra questions correct, and his overall exam mark was 80%. How many geometry questions did he answer correctly?

(A)43　(B)45　(C)39
(D)41　(E)35

15. Six points A, B, C, D, E, and F are placed on a square grid, as shown. How many triangles that are *not* right-angled can be drawn by using 3 of these 6 points as vertices?



(A)2　(B)1　(C)6
(D)0　(E)4

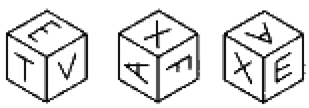
16. In a large hospital with seven operating rooms, ten people are each waiting for a 45 minute operation. The first operation starts at 8:00 a.m., the second at 8:15 a.m., and each of the other operations starts at 15 minute intervals thereafter. When does the last operation end?

(A)10:15 a.m.　(B)10:30 a.m.
(C)10:45 a.m.　(D)11:00 a.m.
(E)11:15 a.m.

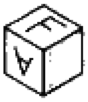
17. Luke has played 20 games and has a 95% winning percentage. Without losing any more games, how many more games in a row must he win to reach exactly a 96% winning percentage?

(A)1　(B)3　(C)4
(D)5　(E)10

18. A different letter is painted on each face of a cube. This cube is shown below in 3 different positions:

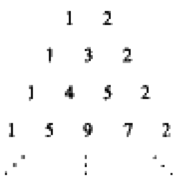


问图中阴影面上的字母是什么？



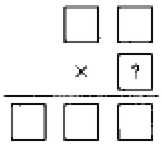
(A)T (B)P (C)X
(D)E (E)V

19. 如图所示：数字排列形式，每一排由 1 开始，由 2 结束。其他数则是上一排直接对着的两个数的和。例如第四排的 9 即是第三排两个对着的数 4 和 5 之和。若按此排列形式继续下去，问第十三排数的总和是多少？



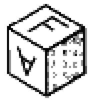
(A)12 270 (B)12 276 (C)12 282
(D)12 288 (E)12 294

20. 6 个空格中分别放有 1,2,3,4,5,6 六个数，并且要使计算结果正确。
如果每个数字只能使用一次，问带问号的空格中的数是多少？



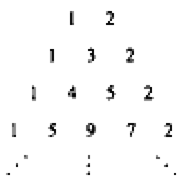
(A)2 (B)3 (C)4
(D)5 (E)6

What letter belongs on the shaded face of this cube in the following diagram?



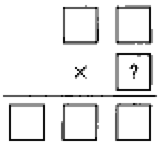
(A)T (B)P (C)X
(D)E (E)V

19. In the pattern of numbers shown, every row begins with a 1 and ends with a 2. Each of the numbers, not on the end of a row, is the sum of the two numbers located immediately above and to the right, and immediately above and to the left. For example, in the fourth row the 9 is the sum of the 4 and the 5 in the third row. If this pattern continues, the sum of all of the numbers in the thirteenth row is



(A)12 270 (B)12 276 (C)12 282
(D)12 288 (E)12 294

20. The digits 1, 2, 3, 4, 5, and 6 are each placed in one of the boxes so that the resulting product is correct. If each of the six digits is used exactly once, the digit represented by "?" is



(A)2 (B)3 (C)4
(D)5 (E)6

试卷十七

Test 17

1. 在一个商店你花费 25 美元就可以得到 5 点回赠。斯图尔特在商店里花费了 200 美元，问他能得到多少点回赠？
(A)5　(B)8　(C)40
(D)125　(E)1 000

2. 下列哪一个分数的值最大？
(A)$\frac{8}{9}$　(B)$\frac{7}{8}$　(C)$\frac{66}{77}$
(D)$\frac{55}{66}$　(E)$\frac{4}{5}$

3. 一个袋子中装有 1 个灰色的球，2 个白色的球和 3 个黑色的球。约翰随意取出一个球。问不是灰色的球的概率是多少？
(A)1　(B)$\frac{2}{6}$　(C)$\frac{3}{6}$
(D)$\frac{4}{6}$　(E)$\frac{5}{6}$

4. 图中所有横向、纵向及对角线方向上的数字和都相等。问 x 值是多少？

14	19	
	15	
x	11	

(A)12　(B)13　(C)16
(D)17　(E)18

5. 图形的周长是多少厘米？
(A)30　(B)28　(C)25
(D)24　(E)22



1. At a Store, you earn 5 "reward points" for each \$25 you spend. When Stuart spends \$200 at the Store, the number of reward points that he earns is
(A)5　(B)8　(C)40
(D)125　(E)1 000

2. Which of the following fractions has the largest value?
(A)$\frac{8}{9}$　(B)$\frac{7}{8}$　(C)$\frac{66}{77}$
(D)$\frac{55}{66}$　(E)$\frac{4}{5}$

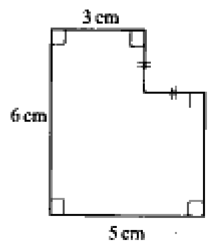
3. A box contains 1 grey ball, 2 white balls and 3 black balls. Without looking, John reaches in and chooses one ball at random. What is the probability that the ball *is not* grey?
(A)1　(B)$\frac{2}{6}$　(C)$\frac{3}{6}$
(D)$\frac{4}{6}$　(E)$\frac{5}{6}$

4. In the diagram, all rows, columns and diagonals have the same sum. What is the value of x?

14	19	
	15	
x	11	

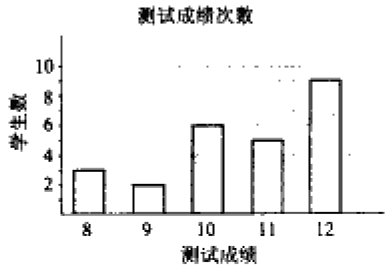
(A)12　(B)13　(C)16
(D)17　(E)18

5. The perimeter of the figure, in cm, is
(A)30　(B)28　(C)25
(D)24　(E)22



6. 在所示的条形图表中,25 名学生的小测试成绩中位值是多少?

(A)8　(B)9　(C)10
(D)11　(E)12



7. 一个湖的海拔高度是 75.00 米,另一个湖的海拔高度是 174.28 米。一条船通过一运河闸在两湖间航行。若船在两湖间的航行需 8 小时,问每个小时的高度变化是多少?

(A)12.41 米　(B)21.79 米　(C)5.25 米
(D)4.14 米　(E)7.80 米

8. 两个正整数的和是 11。问这两个正整数的最大乘积是多少?

(A)11　(B)18　(C)28
(D)35　(E)30

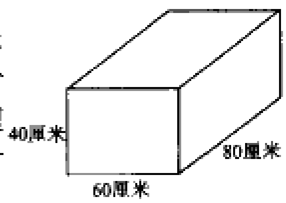
9. 在 3^2 和 3^3 之间有多少个偶数?

(A)9　(B)4　(C)6
(D)10　(E)17

10. 若 $P=1\,000$, $Q=0.01$,问下列哪个计算得到的值最大?

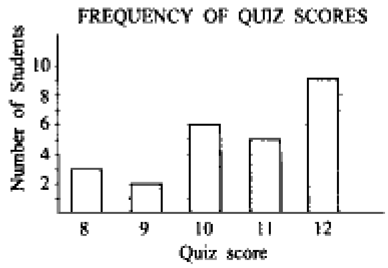
(A)$P+Q$　(B)$P\times Q$　(C)$\frac{P}{Q}$
(D)$\frac{Q}{P}$　(E)$P-Q$

11. 内部尺寸为 40 厘米 × 60 厘米 × 80 厘米的长方形箱子最多能装多少尺寸为 20 厘米 × 30 厘米 × 40 厘米的小长方形木块?



6. What is the median quiz score of the 25 scores shown on the bar graph?

(A)8　(B)9　(C)10
(D)11　(E)12



7. The elevation of one lake is 75.00 m and the elevation of another lake is 174.28 m. A ship travels between the two lakes, passing through the locks of a canal. If the ship takes 8 hours to travel between the lakes, the average (mean) change in elevation per hour is

(A)12.41 m　(B)21.79 m　(C)5.25 m
(D)4.14 m　(E)7.80 m

8. Two positive integers have a sum of 11. The greatest possible product of these two positive integers is

(A)11　(B)18　(C)28
(D)35　(E)30

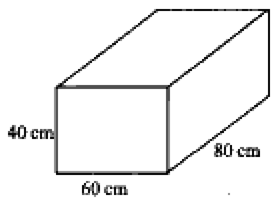
9. How many even whole numbers lie between 3^2 and 3^3?

(A)9　(B)4　(C)6
(D)10　(E)17

10. If $P=1\,000$ and $Q=0.01$, which of the following calculations gives the largest result?

(A)$P+Q$　(B)$P\times Q$　(C)$\frac{P}{Q}$
(D)$\frac{Q}{P}$　(E)$P-Q$

11. What is the maximum number of rectangular wooden blocks with dimensions 20 cm × 30 cm × 40 cm that could fit into a rectangular box with inner dimensions 40 cm × 60 cm × 80 cm?

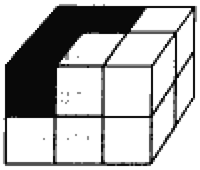


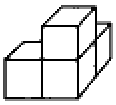
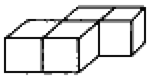
(A)2　(B)4　(C)10
(D)8　(E)6

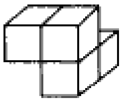
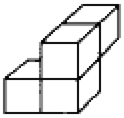
12. 凯恩尝试一新的食谱即用5杯面粉和1杯起酥油。她仅有$\frac{2}{3}$杯的起酥油，并且准备全部用完。问按食谱的比例，她要用多少杯面粉？

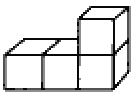
(A)$2\frac{1}{3}$　(B)$3\frac{1}{3}$　(C)$1\frac{2}{3}$
(D)$1\frac{1}{3}$　(E)2

13. 长方形的木质柱体由3块组成，每块又由4个小木头方块粘在一起。问下列图中的木块哪一个与黑色块相同？



(A) 　(B) 

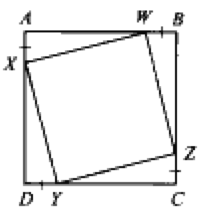
(C) 　(D) 

(E) 

14. 一个两位数可以被8、12和18整除。问这个数介于下列哪两个数之间？

(A)10 和 19　(B)20 和 39　(C)40 和 59
(D)60 和 79　(E)80 和 99

15. 正方形 $ABCD$ 的面积是 64，并且 $AX = BW = CZ = DY = 2$。问正方形 $WXYZ$ 的面积是多少？



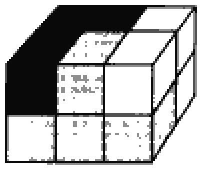
(A)58　(B)52
(C)48　(D)40
(E)36

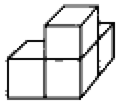
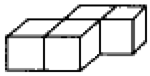
(A)2　(B)4　(C)10
(D)8　(E)6

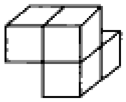
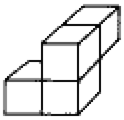
12. Kalyn is trying out a new recipe that calls for 5 cups of flour and 1 cup shortening. She only has $\frac{2}{3}$ cup of shortening, and uses all of it. How much flour should she use to keep the ingredients in the same ratio as called for in the recipe?

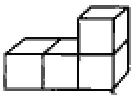
(A)$2\frac{1}{3}$　(B)$3\frac{1}{3}$　(C)$1\frac{2}{3}$
(D)$1\frac{1}{3}$　(E)2

13. A rectangular wooden prism is made up of three pieces, each consisting of four cubes of wood glued together. Which of the pieces below has the same shape as the black piece ?



(A) 　(B) 

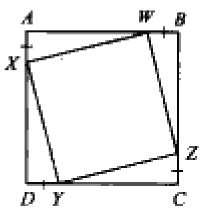
(C) 　(D) 

(E) 

14. A two-digit number is divisible by 8, 12 and 18. The number is between

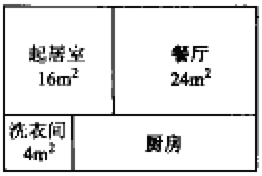
(A)10 and 19　(B)20 and 39　(C)40 and 59
(D)60 and 79　(E)80 and 99

15. The area of square $ABCD$ is 64 and $AX = BW = CZ = DY = 2$. What is the area of square $WXYZ$?



(A)58　(B)52
(C)48　(D)40
(E)36

16. 图中显示了一房子第一层的平面布置。起居室和洗衣间为正方形，三个房间的面积也如图所示。问厨房的面积是多少平方米？



(A)12　　(B)16　　(C)18

(D)24　　(E)36

17. 一罐水果汁可以倒满 9 个小杯和 4 个大杯。这一罐水果汁也可以倒满 6 个小杯和 6 个大杯。若只用大杯来盛，问一罐水果汁最多能盛满多少大杯？

(A)8　　(B)9　　(C)10　　(D)11　　(E)12

18. 从家到办公室 59 千米沙伦需驾车 1 小时。她的行程包括 20 分钟在高速公路上，40 分钟在市区道路上。若在市区道路上的时速为 45 千米，问她在高速公路上的时速是多少千米？

(A)42　　(B)59　　(C)87

(D)90　　(E)100

19. 在 2004 年奥林匹克比赛中，有 6 个参赛选手和 8 个竞赛项目。每个竞赛项目的前 3 名分获得金牌、银牌和铜牌。（比赛不会打平，也不会在一个项目中 1 个参赛选手获得两枚奖牌）。获金牌得 5 分，获银牌得 3 分，获铜牌得 1 分。如果有一个选手得到 27 分，问她最多获得了几块银牌？

(A)6　　(B)2　　(C)3

(D)4　　(E)5

16. In the diagram, the rectangular floor plan of the first floor of a house is shown. The living room and the laundry room are both square. The areas of three of the rooms are shown on the diagram. The area of the kitchen, in m^2, is



(A)12　　(B)16　　(C)18

(D)24　　(E)36

17. The entire contents of a jug can exactly fill 9 small glasses and 4 large glasses of juice. The entire contents of the jug could instead fill 6 small glasses and 6 large glasses. If the entire contents of the jug is used to fill only large glasses, the maximum number of large glasses that can be filled is

(A)8　　(B)9　　(C)10　　(D)11　　(E)12

18. It takes Sharon one hour to drive the 59 km from her home to her office. Her drive includes 20 minutes on a highway and 40 minutes on city roads. If her average speed when she is on city roads is 45 km/h, the average speed, in km/h, at which she drives on the highway is

(A)42　　(B)59　　(C)87

(D)90　　(E)100

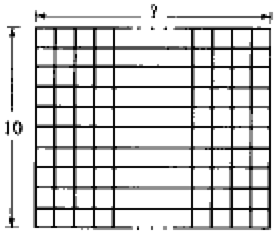
19. In an 2004 Olympics, there are six competitors and eight events. The top three competitors in each event receive gold, silver and bronze medals respectively. (There are no ties at the Olympics, and no competitor can win more than one medal on the same event.) Each competitor scores 5 points for each gold medal, 3 points for each silver medal, and 1 point for each bronze medal. If one of the competitors had a total of 27 points, what is the maximum number of silver medals she could have won?

(A)6　　(B)2　　(C)3

(D)4　　(E)5

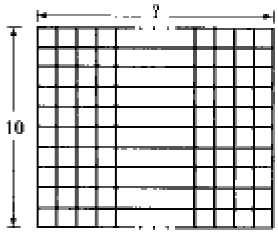
20. 如图所示，有一由单位正方形组成的网格。网格为 10 排，且列数相等。一多米落骨牌(□□)可以横着放，也可以竖着放，并且正好覆盖两个单位正方形。骨牌在网格上有 2 004 个位置可以放置。问网格一共有多少列？

(A)105 (B)106 (C)107 (D)108 (E)109



20. A grid with 10 rows and some number of columns is made up of unit squares, as shown. A domino (□□) can be placed horizontally or vertically to exactly cover two unit squares. There are 2004 positions in which the domino could be placed. The number of columns in the grid is

(A)105 (B)106 (C)107 (D)108 (E)109



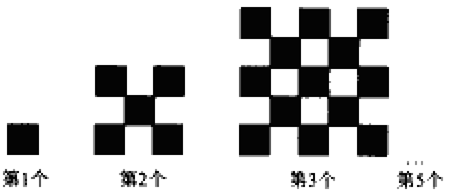
第二部分

试 卷 一

Test 1

1. 按照下图的试样，问第 15 个图形需要多少个黑方块？

(A)403 (B)365 (C)481
(D)421 (E)225



2. 一个盒子中正好放有 24 个相同的方块。若这个盒子每边边长都增加 1 倍，问这时可以放有多少个相同的立方块？

(A)48 (B)96 (C)144
(D)192 (E)信息不足

3. 若 $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$，并且 $\begin{vmatrix} 2x & -4 \\ x & 1 \end{vmatrix} = 18$，问 x 等于多少？

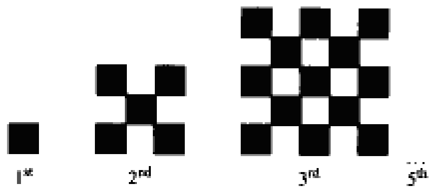
(A) -1 (B)2 (C)3
(D)4 (E)6

4. 在一次宴会上，2 个客人分一盘米饭，3 个客人分一盘汤，4 个客人分一盘肉。若一共有 65 个盘子，问出席宴会的客人有多少？

(A)42 (B)56 (C)60
(D)120 (E)上述答案都不对

1. How many black tiles will be required to build the 15th figure in the given pattern?

(A)403 (B)365 (C)481
(D)421 (E)225



2. A box contains 24 identical cubes. How many cubes can be placed in another box each of whose dimensions is double that of the original box?

(A)48 (B)96 (C)144
(D)192 (E)Not enough information

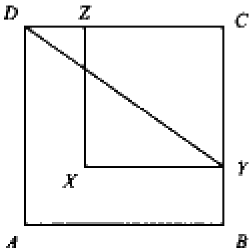
3. If $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$, then solve for x in $\begin{vmatrix} 2x & -4 \\ x & 1 \end{vmatrix} = 18$.

(A) -1 (B)2 (C)3
(D)4 (E)6

4. At a banquet, every 2 guests shared one dish for rice, every 3 guests shared one dish for soup and every 4 guests shared one dish for meat. How many guests were present if there were 65 dishes altogether?

(A)42 (B)56 (C)60
(D)120 (E)None of these

5. $ABCD$ 和 $XYCZ$ 都是正方形。$ABCD$ 以内及 $XYCZ$ 以外的面积为 30 个平方单位。若 $DY=10$，问 CD 等于多少？



(A)$\sqrt{35}$ (B)$\sqrt{65}$ (C)$\frac{\sqrt{130}}{2}$ (D)$\sqrt{10}$ (E)8

6. 有一组男人和女人，平均年龄为 31 岁。若男人的平均年龄是 35 岁，女人的平均年龄是 25 岁，问男人与女人的比例是多少？

(A)5:7 (B)7:5 (C)2:1
(D)4:3 (E)3:2

7. 长方形的底边比高多 4 厘米，周长为 40 厘米。问长方形的面积是多少平方厘米？

(A)90 (B)92 (C)94
(D)96 (E)98

8. 在一俱乐部中女性比男性多 16 人。7 倍的女性比 9 倍的男性多 32 人。问俱乐部中男性人数是多少？

(A)4 (B)24 (C)32
(D)42 (E)上述答案都不对

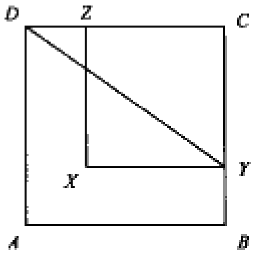
9. 一集合中 10 个数的和为 100。若这个集合中的每个数先增加 20，再乘以 20，最后再减少 20，问这时集合中 10 个数的和是多少？

(A)1 200 (B)2 000 (C)5 800
(D)6 000 (E)信息不足

10. 立方形糖块的边长为 1 厘米。一个空水池的长、宽、高分别为 25 米、10 米、5 米，问这个水池能装有多少个糖块？

(A)125 000 (B)500 000
(C)50 000 000 (D)1 250 000 000
(E)50 000 000 000

5. $ABCD$ and $XYCZ$ are squares. The area inside square $ABCD$, but outside square $XYCZ$ is 30 square units. If $DY=10$, then the length of CD is



(A)$\sqrt{35}$ (B)$\sqrt{65}$ (C)$\frac{\sqrt{130}}{2}$
(D)$\sqrt{10}$ (E)8

6. In a group of men and women, the average age is 31. If the men's ages average 35 years, and the women's ages average 25, then the ratio of the number of men to the number of women is

(A)5:7 (B)7:5 (C)2:1
(D)4:3 (E)3:2

7. The base of a rectangle exceeds its height by 4 cm, and its perimeter is 40 cm. What is its area?

(A)90 (B)92 (C)94
(D)96 (E)98

8. The women in a club outnumber the men by 16. 7 times the number of women exceeds 9 times the number of men by 32. Find the number of men.

(A)4 (B)24 (C)32
(D)42 (E)None of these

9. A set of 10 numbers has sum 100. Each number of the set is increased by 20, then multiplied by 20 then decreased by 20. What is the sum of the numbers in the new set?

(A)1 200 (B)2 000 (C)5 800
(D)6 000 (E)Not enough information

10. The edge of a sugar cube is about 1 cm. Roughly how many sugar cubes could you put in a dry , empty swimming pool which measures 25 m by 10 m by 5 m?

(A)125 000 (B)500 000
(C)50 000 000 (D)1 250 000 000
(E)50 000 000 000

11. 若三角形中三个角角度的比值为3:4:5,问第二大的角是多少度?
(A)20°　(B)40°　(C)60°
(D)80°　(E)100°

11. The three angles of a triangle are in the ratio 3:4:5. What is the middle angle?
(A)20 deg.　(B)40 deg.　(C)60 deg.
(D)80 deg.　(E)100 deg.

12. 图中的树和房子都在同一直线上。在6个房子中每个房子都住有1个小朋友。问应在哪棵树下集合,才能使6个小朋友走的距离的和最小?
(A)A　(B)B　(C)C
(D)D　(E)不能确定

12. The houses and trees in the diagram are all in a straight line. In each of the six houses lives a child. At which tree should the children meet so that the sum of the distances they walk to that tree is a minimum?
(A)A　(B)B　(C)C
(D)D　(E)Impossible to determine



13. 我有6本不同的书,3本是红封面、3本是蓝封面。将这些书放在书架上,并且相同颜色封面的书要隔开。问一共有多少种放法?
(A)6　(B)24　(C)36
(D)72　(E)120

13. I have 6 different books, 3 with red covers and 3 with blue covers. In how many different ways can I arrange these books on a shelf so that no two books of the same colour are next to each other?
(A)6　(B)24　(C)36
(D)72　(E)120

14. 假定一球落下后回弹的高度是原落下高度的一半。若一球从100米处落下,问它第4次着地时已经过了多少距离?
(A)137.5米　(B)187.5米　(C)275米
(D)375米　(E)信息不足

14. Assume that a ball dropped from any height rises half the distance on the rebound. If a ball is dropped from 100 m, what distance will the ball have covered by the time it hits the ground the 4th time?
(A)137.5 m　(B)187.5 m　(C)275 m
(D)375 m　(E)Not enough information

15. 有3个工人X、Y和Z。工人X和Y一起完成一件2工作需4个小时,工人X和Z一起完成这件工作需要6个小时,工人X、Y和Z一起完成这件工作需要3个小时,问工人Y单独完成这件工作需要几个小时?
(A)6小时　(B)8小时　(C)10小时

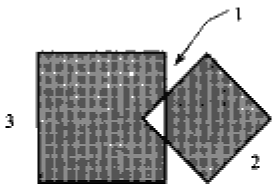
15. Three workers are named X, Y and Z. Suppose that together X and Y can do a job in 4 hours, X and Z can do it in 6 hours and X, Y and Z can do the job in 3 hours. How many hours will Y alone need to do the job?
(A)6 hr　(B)8 hr　(C)10 hr

(D)12 小时　(E)上述答案都不对

16. 问前 100 000 个正奇数的平均值是多少?

(A)100 000　(B)1 000 000
(C)10 000 000　(D)100 000 000
(E)1 000 000 000

17. 问大正方形阴影部分的面积与小正方形阴影部分的面积的差是多少?



(A)1　(B)5
(C)8　(D)2.5
(E)信息不足

18. 用辅音字母 B、C、D 和元音字母 A、E 可以组成多少个 3 个字母的组合? 要求组合有 2 个辅音字母和 1 个元音字母(字母可以重复)。例如 ABC 和 CCE 都是合适的组合。

(A)18　(B)27　(C)54
(D)72　(E)上述答案都不对

19. 你被告知有一些未知正整数 p、q、r 和 s,并且 $\frac{p}{q}=\frac{r}{s}$。问下列哪一个等式是正确的?

(A)$\frac{p}{s}=\frac{r}{q}$　(B)$\frac{p}{r}=\frac{s}{q}$
(C)$\frac{p}{q}=\frac{p+r}{q+s}$　(D)$\frac{r}{s}\neq\frac{r-p}{s-q}$
(E)上述答案都不对

20. 数字 1 至 4 按各种方法排列(但一个数字不能用两次)去构成有四位数的数字。这些四位数从小到大排列并分成相等的两组。问第一组的最后一个数是多少?

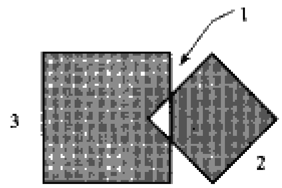
(A)2 314　(B)2 134　(C)2 431
(D)4 123　(E)上述答案都不对

(D)12 hr　(E)None of these

16. The average of the first 100 000 odd positive integers is

(A)100 000　(B)1 000 000
(C)10 000 000　(D)100 000 000
(E)1 000 000 000

17. What is the difference between the areas of the shaded portions of two squares?



(A)1　(B)5
(C)8　(D)2.5
(E)Not enough information

18. How many 3 letter "words" can be made using the consonants B C D, and the vowels A and E? A "word" is defined to be any sequence of 3 letters containing two consonants and one vowel in any order (allowing letters to be repeated). For example, ABC and CCE are both "words".

(A)18　(B)27　(C)54
(D)72　(E)None of these

19. You are told that certain unknown positive integers p, q, r, s satisfy $\frac{p}{q}=\frac{r}{s}$. Which of the following statements must be true?

(A)$\frac{p}{s}=\frac{r}{q}$　(B)$\frac{p}{r}=\frac{s}{q}$
(C)$\frac{p}{q}=\frac{p+r}{q+s}$　(D)$\frac{r}{s}$ doesn't equal $\frac{r-p}{s-q}$
(E)None of these

20. The digits from 1 to 4 are ordered in all possible ways (without repeating the same digit twice) to make 4-digit integers. These are then arranged in increasing numerical order and the list is divided into two equal halves. The last number in the first half is

(A)2 314　(B)2 134　(C)2 431
(D)4 123　(E)None of these

试 卷 二

Test 2

1. 两个数的比值为2:3,这两个数都加上4后的比值为5:7。这两个数的和是多少?
   (A)20 (B)25 (C)30
   (D)35 (E)40

2. 边长为整数的3条边可以组成多少个周长为23的非等腰三角形?
   (A)6 (B)8 (C)13
   (D)23 (E)66

3. a 与 b 的比例为2:3,b 与 c 的比例为4:5,问 a 与 c 的比例是多少?
   (A)8:45 (B)8:37 (C)8:15
   (D)6:9 (E)上述答案都不对

4. 一个数正好是它的倒数的16%,这个数是多少?
   (A)$\frac{1}{50}$ (B)$\frac{4}{25}$ (C)$\frac{2}{5}$
   (D)2 (E)4

5. 一只狗追一只50米以外的兔子。狗每一跃为2米,兔子每一跃为1.6米。问在多少次跳跃后狗才能追上兔子?
   (A)25 (B)100 (C)125
   (D)150 (E)上述答案都不对

6. 机场的停车场收费如下:
   0~1小时　　　1.25美元
   每增加1小时　　0.50美元
   每24小时最高收费　3.50美元

1. Two numbers are in the ratio 2∶3. When 4 is added to each number the ratio changes to 5:7. The sum of the two original numbers is
   (A)20 (B)25 (C)30
   (D)35 (E)40

2. How many non-isosceles triangles of perimeter 23 units can be formed with sides of whole number units?
   (A)6 (B)8 (C)13
   (D)23 (E)66

3. If the ratio of a to b is 2:3 and the ratio of b to c is 4:5, find the ratio of a to c.
   (A)8:45 (B)8:37 (C)8:15
   (D)6:9 (E)None of these

4. If a number is 16% of its own reciprocal, then that number is
   (A)$\frac{1}{50}$ (B)$\frac{4}{25}$ (C)$\frac{2}{5}$
   (D)2 (E)4

5. A dog chases a rabbit which starts 50 meters ahead of the dog. The dog jumps 2 meters every time the rabbit jumps 1.6 meters. In how many leaps will the dog catch the rabbit?
   (A)25 (B)100 (C)125
   (D)150 (E)None of these

6. Parking rates at an airport parking lot are as follows:
   0~1 hours　　　$1.25
   Each additional hour　　$0.50

若从星期五下午 3 点 30 分停车至星期日晚上 11 点,问应缴多少钱?

(A)10.50 美元　(B)11.00 美元

(C)12.25 美元　(D)13.50 美元

(E)上述答案都不对

7. 当火车离横行道口$\frac{1}{4}$千米时就鸣笛警告。若火车的时速为 45 千米,问火车在鸣笛后需要多少秒钟可到达横行道口?

(A)15　(B)20　(C)30

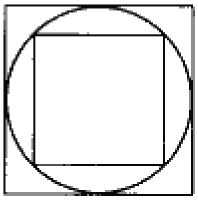
(D)60　(E)上述答案都不对

8. 若分母为 23,问有多少个分数的值介于 0.18 和 0.82 之间?

(A)13　(B)14　(C)15

(D)16　(E)17

9. 若圆的半径为 1,问两个正方形之间的面积是多少?



(A)1　(B)$\sqrt{2}$

(C)2　(D)4

(E)上述答案都不对

10. 计算$\sqrt{5^5+5^5+5^5+5^5+5^5}$的值。

(A)$5\sqrt{5}$　(B)25　(C)$25\sqrt{5}$

(D)125　(E)625

11. 计算 $A+B+C$ 的值,若 A 是 40 的 25%,10 是 B 的 25%,10 是 40 的 C%。

(A)50　(B)65　(C)70

(D)75　(E)80

12. 问有几个两位数其值是十位数和个位数和的 7 倍?

(A)0　(B)1　(C)2

(D)3　(E)4

Maximum for each 24 hour period　$3.50

What is the fee for parking from 3:30 p.m. on Friday to 11:00 p.m. on the following Sunday?

(A) $10.50　(B) $11.00

(C) $12.25　(D) $13.50

(E) None of these

7. A train triggers a warning bell when it is $\frac{1}{4}$ kilometer from a crossing. If the speed of the train is 45 kph, how many seconds after the bell is triggered will the train reach the crossing?

(A)15　(B)20　(C)30

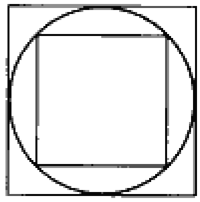
(D)60　(E)None of these

8. How many fractions whose denominator is 23 have values between 0.18 and 0.82?

(A)13　(B)14　(C)15

(D)16　(E)17

9. If the radius of the circle is 1, what is the area of the region located between the 2 squares?



(A)1　(B)$\sqrt{2}$

(C)2　(D)4

(E)None of these

10. Evaluate: $\sqrt{5^5+5^5+5^5+5^5+5^5}$.

(A)$5\sqrt{5}$　(B)25　(C)$25\sqrt{5}$

(D)125　(E)625

11. Find $A+B+C$, if A is 25% of 40, 10 is 25% of B, and 10 is C% of 40.

(A)50　(B)65　(C)70

(D)75　(E)80

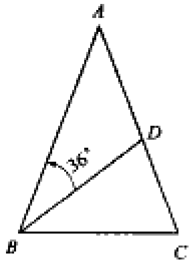
12. How many two digit numbers are equal to seven times the sum of their digits?

(A)0　(B)1　(C)2

(D)3　(E)4

13. 在 $\triangle ABC$ 中，$AB = AC$，$BD = BC$，若$\angle ABD = 36°$，问$\angle ABC$ 等于多少度？

(A)45°　(B)72°
(C)75°　(D)54°
(E)60°



14. 用第 220 个正奇数减去第 171 个正偶数后其值为 Z。确定 Z 的值。

(A)48　(B)49　(C)97
(D)99　(E)上述答案都不对

15. 所有小于 49 的正整数相乘。问乘积以几个零结尾？

(A)5　(B)9　(C)10
(D)48　(E)49

16. 一个汽车销售人员销售 3 种汽车。第一天他售出了 3 辆 A 型车、2 辆 B 型车，总收入为 260 000 美元。第二天他售出了 3 辆 B 型车、2 辆 C 型车，总收入为 160 000 美元。第三天他售出了 3 辆 C 型车、2 辆 A 型车，总收入为 180 000 美元。问一辆 C 型车的售价是多少美元？

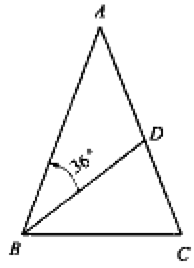
(A)20 000 美元　(B)30 000 美元
(C)40 000 美元　(D)50 000 美元
(E)60 000 美元

17. 叙日斯和迪列伯两个小镇又到了结婚的季节。叙日斯小镇有 3 个小伙子、2 个姑娘准备结婚，而迪列伯小镇则有 2 个小伙子、3 个姑娘准备结婚。若同镇的人不能结婚，问一共有多少不同的婚礼？

(A)5　(B)12　(C)13
(D)36　(E)108

13. In $\triangle ABC$ $AB = AC$ and $BD = BC$. If $\angle ABD = 36°$, the size of $\angle ABC$ in degrees is

(A)45°　(B)72°
(C)75°　(D)54°
(E)60°



14. When the 171st positive even integer is subtracted from the 220th positive odd integer the result is Z. Determine Z.

(A)48　(B)49　(C)97
(D)99　(E)None of these

15. All of the positive integers less than 49 are multiplied together. How many zeros will this product end in?

(A)5　(B)9　(C)10
(D)48　(E)49

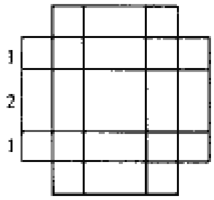
16. A car dealer sells 3 types of car . On the first day ,he sells 3 cars of model A and 2 of model B for a sum of \$ 260 000. On the second day ,he sells 3 cars of model B and 2 cars of model C for a sum of \$ 160 000, and on the third day ,he sells 3 cars of model C and 2 cars of model A for a total of \$ 180 000. What is the price of one model C car?

(A) \$ 20 000　(B) \$ 30 000
(C) \$ 40 000　(D) \$ 50 000
(E) \$ 60 000

17. In the towns of Sirius and Deneb it is the season for weddings. There are 3 boys and 2 girls in Sirius as well as 2 boys and 3 girls in Deneb who are ready to be married. If a person cannot marry someone from their own village, how many distinct weddings are possible?

(A)5　(B)12　(C)13
(D)36　(E)108

18. 下列图形中有多少个正方形?



(A)12 (B)17
(C)21 (D)22
(E)26

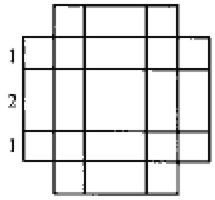
19. 在冥王星上,大怪兽有两个头,三条腿,小怪兽有一个头、四条腿。一个高个子的普路托神从栅栏上面看到10个头,一个矮个子的普路托神从栅栏下面看到25条腿。问栅栏后面有多少个大怪兽?

(A)2 (B)3 (C)4
(D)5 (E)6

20. 问满足 $2\,000<5^{x-1}<20\,000$ 的整数 x 值的和是多少?

(A)4 (B)6 (C)9
(D)11 (E)上述答案都不对

18. How many squares are there in the following symmetric diagram?



(A)12 (B)17
(C)21 (D)22
(E)26

19. On the planet Pluto, plouks have 2 heads and 3 legs and zuves have 1 head and 4 legs. A tall plutonian observes 10 heads by looking over a fence. A small plutonian looking under the same fence observes 25 legs. How many plouks there are behind this fence?

(A)2 (B)3 (C)4
(D)5 (E)6

20. Find the sum of all the integers x for which $2\,000<5^{x-1}<20\,000$.

(A)4 (B)6 (C)9
(D)11 (E)None of these

试 卷 三

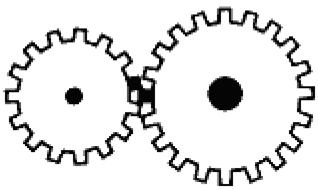
Test 3

1. 在一次聚会上每个人都与其他人握一次手。握手的总次数为 66 次。问有多少人出席了聚会？

(A)6　　(B)11　　(C)12
(D)18　　(E)33

2. 如图所示，小齿轮有 15 个齿、大齿轮有 20 个齿。在大、小齿轮上都标出 1 个齿（黑色）。问小齿轮转多少圈后，两个标出的齿会第 1 次相遇？

(A)1　　(B)2　　(C)3
(D)4　　(E)5



3. 你同时掷两个普通的骰子（正方体），一个是红的，一个是蓝的。红骰子显示的数值乘以 10，蓝骰子显示的数值乘以 5，再将这两个数相加得到你的最终结果。问可能有多少种不同的结果？

(A)12　　(B)16　　(C)18
(D)36　　(E)上述答案都不对

4. 两个整数的平方和是 34，而平方差为 16。问两个整数中较小的一个数的三次方值是多少？

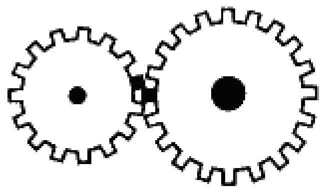
(A)1　　(B)8　　(C)27
(D)64　　(E)125

1. At a party ,each person shakes hands with every other person. The total number of handshakes was 66. How many persons are present at the party?

(A)6　　(B)11　　(C)12
(D)18　　(E)33

2. Two gears, one with 15 teeth and the other one with 20 teeth, fit together as shown in the figure. Each has a marked tooth as indicated. After how many rotations of the gear with 15 teeth will the marked tooth be together again for the first time?

(A)1　　(B)2　　(C)3
(D)4　　(E)5



3. You throw two ordinary dice (with 6 faces each), one red and one blue. The number shown on the red dice is multiplied by 10 and the one shown by the blue dice is multiplied by 5. Those two numbers are then added together to obtain your final result. How many distinct results are possible ?

(A)12　　(B)16　　(C)18
(D)36　　(E)None of these

4. The sum of the squares of two integers is 34 and the difference of the squares of those same integers is 16. Find the cube of the smallest of those integers.

(A)1　　(B)8　　(C)27
(D)64　　(E)125

5. 一病毒感染了计算机。在计算机的存贮器中，从2到9的每一个数 x 被 $1+2+3+\cdots+x$ 的和代替。例如2被3（$3=1+2$）代替，5被15（$15=1+2+3+4+5$）代替。计算机的其他性能都正常。你若要计算 $1+3+5$，计算机会显示什么结果？

(A)9　(B)15　(C)21
(D)22　(E)25

6. $2^{1\,999}+3^{2\,000}$ 的个位数是多少？

(A)1　(B)3　(C)5
(D)7　(E)9

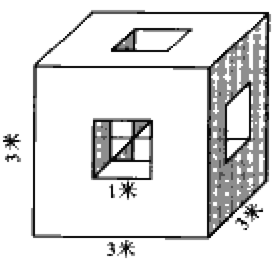
7. 问数列 $\frac{2}{3},\frac{4}{9},\frac{8}{27},\frac{16}{81},\frac{32}{243},\cdots$ 的下一项是多少？

(A)$\frac{48}{324}$　(B)$\frac{64}{729}$　(C)$\frac{64}{486}$
(D)$\frac{48}{486}$　(E)上述答案都不对

8. 采伐工程师发现一井区有3 000棵树可以砍伐。这个井区中有40%的树为针叶树，60%的树为阔叶树。62%的阔叶树为枫树，25%的针叶树为松树。问一共有多少棵枫树和松树可以被砍伐？

(A)1 326　(B)1 416　(C)1 500
(D)2 610　(E)上述答案都不对

9. 如图所示，一正方体的边长为3米，正方体各个面的中央都开有边长为1米的正方形洞，并且从一个面一直穿到对面。问新正方体的表面积是多少平方米？



(A)72　(B)76　(C)78
(D)80　(E)84

5. A virus infects your computer. In the computer's memory, each number x from 2 to 9 is replaced by the sum $1+2+\cdots+x$. For example, 2 is replaced by 3 ($3=1+2$) and 5 is replaced by 15 ($15=1+2+3+4+5$). Everything else works normally. If you enter $1+3+5$, what result will be shown by the computer?

(A)9　(B)15　(C)21
(D)22　(E)25

6. What is the unit digit of $2^{1\,999}+3^{2\,000}$?

(A)1　(B)3　(C)5
(D)7　(E)9

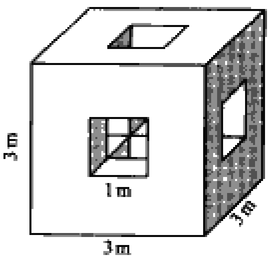
7. What is the next term in the sequence $\frac{2}{3},\frac{4}{9},\frac{8}{27},\frac{16}{81},\frac{32}{243},\cdots$?

(A)$\frac{48}{324}$　(B)$\frac{64}{729}$　(C)$\frac{64}{486}$
(D)$\frac{48}{486}$　(E)None of these

8. In a woodlot a forest engineer has found that 3 000 trees are ready for cutting. In this woodlot 40% of the trees are conifers, and 60% are "leafy" trees. Also 62% of the leafy trees are maples, while 25% of the conifers are pines. Altogether, how many maples and pines can be cut?

(A)1 326　(B)1 416　(C)1 500
(D)2 610　(E)None of these

9. A solid cube with 3 metre side lengths has square holes cut through it from the middle of each face to the middle of the opposite face, as shown. The three holes intersect in the middle of the cube. The square windows so produced have side lengths of 1 metre each. What is the total surface area, in square metres, of the new solid?



(A)72　(B)76　(C)78
(D)80　(E)84

10. 若正方体的边长增加 50%，问新的正方体的表面积是原正方体表面积的几倍？

(A)0.50　(B)1.25　(C)1.50
(D)2.00　(E)2.25

10. The edge of a cube is increased by 50%. The ratio of its new surface area to its old is

(A)0.50　(B)1.25　(C)1.50
(D)2.00　(E)2.25

11. 计算$\frac{10^{10}-10^{8}}{10^{9}}$的值。

(A)9.9　(B)99　(C)100
(D)10^9　(E)上述答案都不对

11. Evaluate the expression $\frac{10^{10}-10^{8}}{10^{9}}$.

(A)9.9　(B)99　(C)100
(D)10^9　(E)None of these

12. 表达式$\frac{1}{2}@\frac{1}{3}@\frac{1}{6}@\frac{1}{18}$中@可以是 + 号或 − 号。问下列哪个值不可能为表达式的值？

(A)$-\frac{1}{18}$　(B)$\frac{3}{18}$　(C)$\frac{5}{18}$
(D)$\frac{7}{18}$　(E)$\frac{19}{18}$

12. In the expression $\frac{1}{2}@\frac{1}{3}@\frac{1}{6}@\frac{1}{18}$, each@ can be replaced by either a + sign or a − sign. What value given below can not be a result of this expression?

(A)$-\frac{1}{18}$　(B)$\frac{3}{18}$　(C)$\frac{5}{18}$
(D)$\frac{7}{18}$　(E)$\frac{19}{18}$

13. 一位女士每天在同一时刻到达火车站，她的丈夫开车从家出发去接她，他们按同样的速度驾车，并且在同样的时间返回到家。有一天，该女士早 1 个小时到达火车站，并步行回家。她的丈夫在路上与她相遇，然后俩人一起驾车回家，这一次到家的时间比平常早了 10 分钟。假设步行和驾车的速度均为恒速，问该女士与丈夫相遇时已步行了多少分钟？

(A)10　(B)50　(C)55
(D)70　(E)90

13. A woman arrives at the station at the same time every day. Her husband drives from home to the station to pick her up. They always arrive back at their house at the same time every day, driving at the same speed. One day she arrives at the station one hour early and starts to walk home. Her husband meets her along the road and they drive home together. They arrived home 10 minutes earlier than usual. Assuming all speeds of walking and driving are constant and all transfers are immediate, how long had the woman been walking when her husband met her? (answer in minutes)

(A)10　(B)50　(C)55
(D)70　(E)90

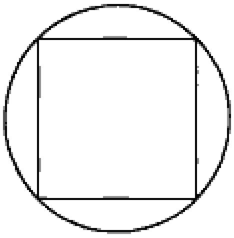
14. 一个尺寸为 105 厘米 × 24 厘米的阳光板上铺有各种大小的正方形硅晶片。要求硅晶片不重叠，问至少需要多少硅晶片？

(A)10　(B)24　(C)168
(D)2 520　(E)上述答案都不对

14. A solar panel measuring 105 cm by 24 cm is to be covered with square silicon wafers of varying sizes. Find the minimum number of squares needed to cover the panel exactly without overlapping.

(A)10　(B)24　(C)168
(D)2 520　(E)None of these

15. 一正方形内接于一半径为 1 的圆。问正方形周长与圆周长的和是多少？



(A)$4+2\pi\sqrt{2}$

(B)$4+2\pi$

(C)$4\sqrt{2}+2\pi$

(D)$8+2\pi$　　(E)上述答案都不对

16. 三角形的三条边的边长分别为 5 厘米、6 厘米和 7 厘米。一只蚂蚁在三角形外，且总是离三角形 1 厘米。问蚂蚁绕三角形一圈一共爬行了多少厘米？

(A)19　　(B)21　　(C)24

(D)$18+\pi$　　(E)$18+2\pi$

17. x 和 $2x$ 都是 3 位数。若 x 的 3 个数字的和是 19，问 $2x$ 的 3 个数字的和是多少？

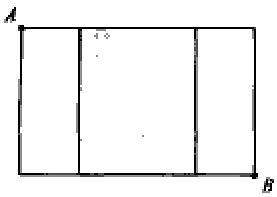
(A)18　　(B)19　　(C)20

(D)26　　(E)信息不足

18. 如下图所示，两个面积均为 36 的正方形相互重叠。若重叠部部为正方形的$\frac{2}{3}$，问从 A 到 B 的距离是多少？

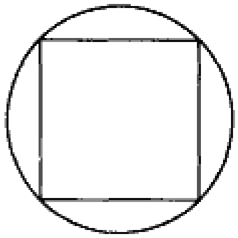
(A)$6\sqrt{2}$　　(B)10　　(C)$6\sqrt{3}$

(D)12　　(E)上述答案都不对



19. 计算 $\left(1-\frac{2}{3}\right)\left(1-\frac{2}{4}\right)\left(1-\frac{2}{5}\right)\cdots\left(1-\frac{2}{98}\right)\left(1-\frac{2}{99}\right)\left(1-\frac{2}{100}\right)$的值。

15. A square is inscribed in a circle of radius 1. What is the sum of the lengths of the square's perimeter and the circle circumference?



(A)$4+2\pi\sqrt{2}$

(B)$4+2\pi$　　(C)$4\sqrt{2}+2\pi$

(D)$8+2\pi$　　(E)None of these

16. An ant walks around a triangle with sides 5 cm, 6 cm, and 7 cm so that it always stays 1 cm from the outside of the triangle. When it returns to its starting point for the first time, in cm, it has walked

(A)19　　(B)21　　(C)24

(D)$18+\pi$　　(E)$18+2\pi$

17. x and $2x$ are both 3 digit integers. If the sum of the digits of x is 19, what is the sum of the digits of $2x$?

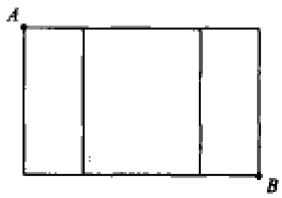
(A)18　　(B)19　　(C)20

(D)26　　(E)Not enough information

18. Two squares, each of area 36 overlap as shown in the diagram at the right. If the overlapping area is 2/3 of one of the squares, what is the distance between the points A and B?

(A)$6\sqrt{2}$　　(B)10　　(C)$6\sqrt{3}$

(D)12　　(E)None of these



19. Find the value of this product of 98 numbers:

$$\left(1-\frac{2}{3}\right)\left(1-\frac{2}{4}\right)\left(1-\frac{2}{5}\right)\cdots\left(1-\frac{2}{98}\right)\left(1-\frac{2}{99}\right)\left(1-\frac{2}{100}\right).$$

(A)$\frac{1}{10}$ (B)$\frac{98}{100}$ (C)$\frac{1}{6}$

(D)$\frac{1}{582\ 120}$ (E)$\frac{1}{4\ 950}$

20. 下列哪个数值最大?

(A)2^{222} (B)2 222 (C)22^{22}

(D)222^{2} (E)$2^{2^{2^{2}}}$

(A)$\frac{1}{10}$ (B)$\frac{98}{100}$ (C)$\frac{1}{6}$

(D)$\frac{1}{582\ 120}$ (E)$\frac{1}{4\ 950}$

20. Which of the following numbers is the largest?

(A)2^{222} (B)2 222 (C)22^{22}

(D)222^{2} (E)$2^{2^{2^{2}}}$

试　卷　四

Test　4

1. 自动扶梯停止运行时1个小孩要用90秒钟才能走完60米长的自动扶梯。自动扶梯运行时则可用60秒钟将乘客从底端送到顶端。若小孩在运行的自动扶梯上行走，问小孩从扶梯底端到达顶端需要多长时间？
   (A)30秒　(B)36秒　(C)40秒
   (D)45秒　(E)50秒

2. 问2^{2004}的一半等于多少？
   (A)2^{1002}　(B)2^{2002}　(C)2^{2003}
   (D)1^{2004}　(E)1^{1002}

3. 问999 999×666 666乘积的各位数的和等于多少？
   (A)54　(B)63　(C)72
   (D)81　(E)90

4. 一个卖水果的小贩将她的桃子展示成金字塔形。其底为正方形，6层高，问堆这个金字塔一共需多少个桃子？
   (A)21　(B)84　(C)91
   (D)72　(E)36

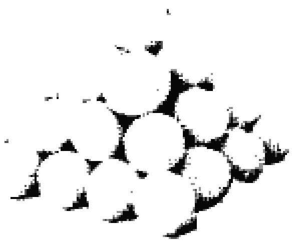


1. It takes a child 90 seconds to climb the 60 m. length of an escalator which is not working. When in operation, the escalator lifts a passenger from bottom to top in 60 seconds. How long does it take the child to cover the 60 meters, if she walks on the moving escalator?
   (A)30 sec.　(B)36 sec.　(C)40 sec.
   (D)45 sec.　(E)50 sec.

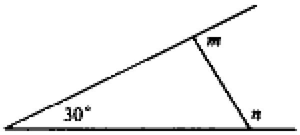
2. Half of 2^{2004} is
   (A)2^{1002}　(B)2^{2002}　(C)2^{2003}
   (D)1^{2004}　(E)1^{1002}

3. What is the sum of the digits of the following product?
   999 999×666 666
   (A)54　(B)63　(C)72
   (D)81　(E)90

4. A fruit vendor makes a display with her peaches in a pyramid structure. The pyramid has a square base. She manages to make a display six layers high. The number of peaches she needs for this display is
   (A)21　(B)84　(C)91
   (D)72　(E)36



5. 图中角 m 的度数是角 n 的度数的 2/3。问角 m 是多少度?

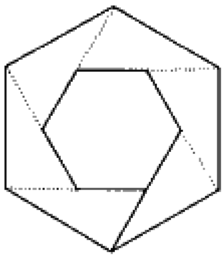


(A)75°
(B)60°
(C)54° (D)96° (E)84°

6. 若 $n>5$,问下列哪一个表达式的值最小?

(A)$\frac{5}{n}$ (B)$\frac{5}{n+1}$ (C)$\frac{5}{n-1}$
(D)$\frac{n}{5}$ (E)$\frac{n+1}{5}$

7. 正六边形的边向外延长一倍,连接端点后又构成一个大的正六边形。问小正六边形的面积是大正六边形的面积的几分之几?



(A)$\frac{1}{3}$ (B)$\frac{1}{2}$
(C)$\frac{1}{4}$ (D)$\frac{3}{8}$ (E)$\frac{1}{6}$

8. $(7^5)^3$ 的个位数是几?

(A)1 (B)3 (C)5
(D)7 (E)9

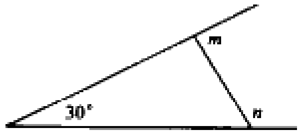
9. $A=6a3$、$B=2b5$,即都是三位数。若 $A+B$ 可被 9 整除,问 $a+b$ 等于多少?

(A)2 (B)9 (C)12
(D)18 (E)上述答案都不对

10. 若 a,b 和 c 为三个数,并且 $a>b$。问下列哪一项总是对的?

(A)$\frac{1}{a}>\frac{1}{b}$ (B)$ac>bc$

5. In the diagram the angle m is $\frac{2}{3}$ the size of n. The value of m is

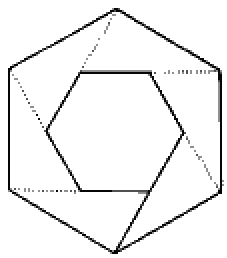


(A)75° (B)60° (C)54°
(D)96° (E)84°

6. If $n>5$, which of the following expressions is the smallest?

(A)$\frac{5}{n}$ (B)$\frac{5}{n+1}$ (C)$\frac{5}{n-1}$
(D)$\frac{n}{5}$ (E)$\frac{n+1}{5}$

7. Each side of a regular hexagon is extended by a length equal to its own length. The end points of the new segments are joined to form a new and larger regular hexagon. What fraction of the area of the bigger hexagon does the smaller hexagon occupy?



(A)$\frac{1}{3}$ (B)$\frac{1}{2}$ (C)$\frac{1}{4}$
(D)$\frac{3}{8}$ (E)$\frac{1}{6}$

8. The last digit in $(7^5)^3$ is

(A)1 (B)3 (C)5
(D)7 (E)9

9. Let $A=6a3$ and $B=2b5$ be two 3 digit numbers. If 9 divides $A+B$, then one correct value for $a+b$ is

(A)2 (B)9 (C)12
(D)18 (E)None of these

10. If a, b and c are 3 numbers such that $a>b$, which of the following is always true?

(A)$\frac{1}{a}>\frac{1}{b}$ (B)$ac>bc$

(C)$a^2>b^2$　　(D)$a+c>b+c$

(E)$\frac{1}{a}<\frac{1}{b}$

11. 1个小孩将边长为1厘米的42个立方块粘在一起形成一实心的矩形砖。若矩形砖的底边的周长为18厘米，问高是多少厘米？

(A)2　(B)$\frac{7}{3}$　(C)3
(D)6　(E)7

12. 两个骑车人在不同的赛道上训练。骑车人A用圆形赛道，其直径是1千米，骑车人B用直线赛道，其长度为5千米。骑车人A用10分钟完成3圈，两骑车人B用5分钟进行了两个来回。问骑车人A与骑车人B的速度比是多少？

(A)6π　(B)18π　(C)$\frac{\pi}{10}$
(D)$\frac{3}{4}$　(E)上述答案都不对

13. 有一组数：1,2,3,4,5,…,10 000。问这组数中有多少个数会有两个相邻的9。(例如993、1992、9 929但9 295或1 999则不能计算在内)？

(A)280　(B)271　(C)270
(D)261　(E)123

14. 两个自然数分别表示为n^2和n^2-1。问下列哪个论述肯定是正确的？

(A)两个数都是奇数
(B)两个数都是偶数
(C)两个数都是4的倍数
(D)仅有一个是4的倍数
(E)两个数的和是偶数

15. 一列慢车从A市到B市按每小时36千米行驶会晚点9分钟，若按每小时27千米行驶则会晚点39分钟。问A市到B市之间的距离是多少千米？

(C)$a^2>b^2$　　(D)$a+c>b+c$

(E)$\frac{1}{a}<\frac{1}{b}$

11. A child glues together 42 cubes each side of which is 1 cm in length to form a solid rectangular brick. If the perimeter of the base is 18 cm, then its height is

(A)2　(B)7/3　(C)3
(D)6　(E)7

12. Two cyclists practice on two different tracks. Cyclist A uses a circular track having a diameter of 1 km while cyclist B uses a line track which is 5 km long. Cyclist A completes three laps on his track in 10 minutes and cyclist B completes 2 laps in 5 minutes. What is the ratio of the speed of cyclist A compared to that of cyclist B?

(A)6π　(B)18π　(C)$\frac{\pi}{10}$
(D)$\frac{3}{4}$　(E)None of these

13. How many numbers are there in the list 1,2,3,4,5,…,10 000 which contain exactly two consecutive 9 such as 993, 1992 and 9 929 but not 9 295 or 1999?

(A)280　(B)271　(C)270
(D)261　(E)123

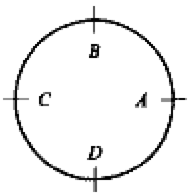
14. Suppose two natural numbers are represented by n^2 and n^2-1. Which of the following must necessarily be true?

(A)Both are odd numbers
(B)Both are even numbers
(C)Both numbers are multiples of 4
(D)Exactly one of the numbers is a multiple of 4
(E)The sum of the numbers is even

15. A slow train travelling from A city to B city arrives 9 minutes late when travelling at 36 km/h. If it travels at 27 km/h it arrives 39 minutes late. What is the distance between A city and B

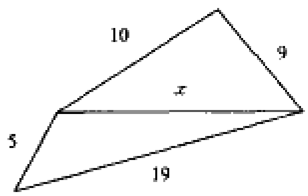
(A)54　(B)90　(C)48
(D)36　(E)64

16. 艾伯特从 A 点开始，按 12 千米/小时的速度、顺时针方向沿圆轨道行进。本日盖茨同时从 B 点开始，按 8 千米/小时的速度、顺时针方向沿圆轨道行进。问在哪一点他们会相遇？



(A)A　(B)B　(C)C
(D)D　(E)信息不足

17. x 等于答案中的一个值。问 x 应是多少？
(A)9　(B)10　(C)14
(D)15　(E)20



18. 若 $a \times b = \frac{1}{ab}$，问 $a \times (b \times c)$ 等于多少？

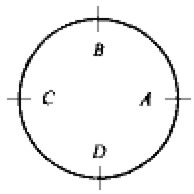
(A)$\frac{1}{abc}$　(B)$\frac{a}{bc}$　(C)$\frac{bc}{a}$
(D)$\frac{ab}{c}$　(E)上述答案都不对

19. 若你第一天节省 10 美分，第二天节省 20 美分，第三天节省 30 美分，以此类推，问节省的总钱数为 10 美元以上至少需要多少天？
(A)5　(B)14　(C)50
(D)100　(E)1 000

20. 三个半圆的弧长如图中所示。问阴影部分的面积是多少？

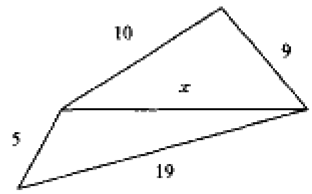
city?
(A)54　(B)90　(C)48
(D)36　(E)64

16. Albert starts at the point A and walks at a speed of 12 km/hr in a clockwise direction around the track. At the same time Brigitte starts at B and walks in the same direction at 8 km/hr. At what point will they meet?



(A)A　(B)B　(C)C
(D)D　(E)Not enough information

17. The distance x is known to be one of the following answers. Which is it ?
(A)9　(B)10　(C)14
(D)15　(E)20



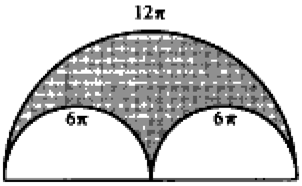
18. If $a \times b = 1/(ab)$, then $a \times (b \times c)$ equals

(A)$\frac{1}{abc}$　(B)$\frac{a}{bc}$　(C)$\frac{bc}{a}$
(D)$\frac{ab}{c}$　(E)None of these

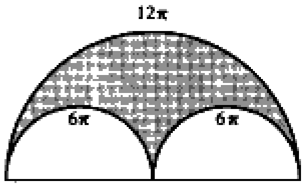
19. If you save 10 cents the first day, 20 cents the second, 30 cents the third and so on, the minimum number of days needed to save a total of more than \$ 10 is
(A)5　(B)14　(C)50
(D)100　(E)1 000

20. The arc lengths of the three semi-circles are indicated on the diagram. What is the area of the shaded region?

(A)18π　　(B)36π　　(C)54π
(D)72π　　(E)144π



(A)18π　　(B)36π　　(C)54π
(D)72π　　(E)144π



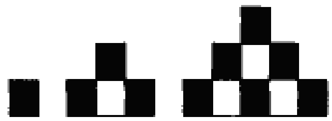
试 卷 五

Test 5

1. 如图所示,每一图形都由黑白两种方块按一定的规律构成。若继续按这种方法构成图形,问第 50 个图形中有多少个黑方块?

(A)49 (B)50 (C)51

(D)$66\frac{2}{3}$ (E)75



2. 3 个连续整数的和是其中最小一个数的 4 倍。问这 3 个连续整数的乘积是多少?

(A)17 (B)20 (C)45

(D)60 (E)81

3. 数列的前几项是 1,2,5,10,17,问数列的第七项可能是多少?

(A)24 (B)26 (C)37

(D)50 (E)上述答案都不对

4. 芦卡、查特和雷切尔要买一价格为 90 美元的自行车。芦卡支付的钱是查特的两倍,雷切尔支付的钱是芦卡和查特的平均值。问查特支付了多少钱?

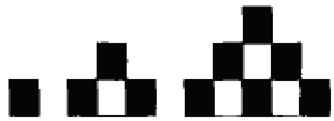
(A)10 美元 (B)20 美元 (C)30 美元

(D)40 美元 (E)上述答案都不对

1. Three figures consist of alternate black and white square tiles as shown. If this pattern continues, what percentage of the number of tiles in the 50th figure will be black?

(A)49 (B)50 (C)51

(D)$66\frac{2}{3}$ (E)75



2. The sum of three consecutive integers is equal to four times the smallest of them. What is the value of the product of the three integers?

(A)17 (B)20 (C)45

(D)60 (E)81

3. The first few terms of a sequence are 1,2,5,10, 17. A possible value for the seventh term of the sequence is

(A)24 (B)26 (C)37

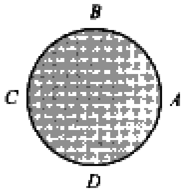
(D)50 (E)None of these

4. Luc, Chantal and Rachelle want to purchase a bicycle which costs \$90. Luc can pay twice as much as Chantal while Rachelle can pay the average amount payed by Luc and Chantal. What is the amount paid by Chantal?

(A) \$10 (B) \$20 (C) \$30

(D) \$40 (E)None of these

5. 汤姆在一圆形场地上慢跑 1 小时。他从 A 点出发，10 分钟后到 B 点，然后加速一倍继续前进。问 1 小时后他在哪一点上？



(A) A　　(B) B

(C) C　　(D) D

(E)上述答案都不对

6. 下列哪个表达式的值最大？

(A) 1　　(B) $\dfrac{1}{\frac{1}{2}+\frac{1}{3}}$　　(C) $\left(1+\frac{1}{10}\right)^3$

(D) $\dfrac{1+\frac{1}{6}}{1-\frac{1}{6}}$　　(E) $\left(1-\frac{1}{10}\right)^3$

7. 若 6 个成年男性种 80 棵树需要 10 个小时，两个小孩可以完成 1 个成年男性的工作。问 3 个成年男性和 3 个小孩可以在 5 个小时内种多少棵树？

(A) 16　　(B) 24　　(C) 30

(D) 40　　(E) 60

8. $\dfrac{1}{\sqrt{3}-\sqrt{2}}$ 不等于下列哪一项？

(A) $\sqrt{3}+\sqrt{2}$　　(B) $\dfrac{\sqrt{2}}{\sqrt{6}-2}$　　(C) $\dfrac{\sqrt{3}-\sqrt{2}}{5-2\sqrt{6}}$

(D) $\dfrac{\sqrt{3}}{9-\sqrt{6}}$　　(E)上述答案都不对

9. 火车长 300 米，速度为 100 千米/小时。一个同方向行走的人的速度为 10 千米/小时。问火车需要多少秒钟才能全部超过这一行人？

(A) 9.8　　(B) 10.8　　(C) 12

(D) 15　　(E)上述答案都不对

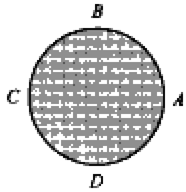
10. 问 $2^{2\,000}+2^{2\,001}+2^{2\,002}$ 的个位数是几？

(A) 0　　(B) 2　　(C) 4

(D) 6　　(E) 8

11. 6 个数分别表示为 a,b,c,d,e 和 f。a,b,c,d

5. Tom wants to jog a circular track for an hour. He starts at A and reaches B in 10 minutes. He then doubles his speed and continues at this speed. At the end of the hour he will be at



(A) A　　(B) B

(C) C　　(D) D

(E) None of these

6. Which of the following expressions is the largest?

(A) 1　　(B) $\dfrac{1}{\frac{1}{2}+\frac{1}{3}}$　　(C) $\left(1+\frac{1}{10}\right)^3$

(D) $\dfrac{1+\frac{1}{6}}{1-\frac{1}{6}}$　　(E) $\left(1-\frac{1}{10}\right)^3$

7. If 6 men take 10 hours to plant 80 trees and if it takes two children to do the work of a single man, how many trees will a team of three men and 3 children plant in 5 hours?

(A) 16　　(B) 24　　(C) 30

(D) 40　　(E) 60

8. $\dfrac{1}{\sqrt{3}-\sqrt{2}}$ is not equal to

(A) $\sqrt{3}+\sqrt{2}$　　(B) $\dfrac{\sqrt{2}}{\sqrt{6}-2}$　　(C) $\dfrac{\sqrt{3}-\sqrt{2}}{5-2\sqrt{6}}$

(D) $\dfrac{\sqrt{3}}{9-\sqrt{6}}$　　(E) None of these

9. How many seconds will it take for a train 300 meters long travelling at 100 km/hr to pass a man jogging at 10 km/hr in the same direction?

(A) 9.8　　(B) 10.8　　(C) 12

(D) 15　　(E) None of these

10. The units digit of $2^{2\,000}+2^{2\,001}+2^{2\,002}$ is

(A) 0　　(B) 2　　(C) 4

(D) 6　　(E) 8

11. Six numbers are represented by a,b,c,d,e and

的平均值为 10；b,c,d,e,f 的平均值为 14。若 f 是 a 的两倍，问 a 和 e 的平均值等于多少？

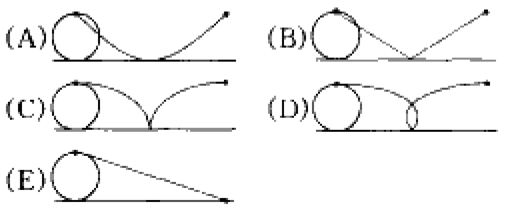
(A)10　(B)11　(C)12
(D)13　(E)15

12. 两个运动员约翰尼和莎拉从同一起跑线出发，沿圆形跑道向相反的方向跑去。俩人每相遇一次，莎拉就给约翰尼 1 美元。莎拉的速度是约翰尼的 3 倍。若要保证约翰尼得到 120 美元，问莎拉需要跑多少圈？

(A)30　(B)40　(C)50
(D)60　(E)90

13. 如图所示，一个硬币沿一直线滚动、并且没有滑动。问硬币外缘一点的运动轨迹是哪一个？





14. 若一个四位数 $5ab4$ 是一个数的平方，问 $a+b$ 等于多少？

(A)8　(B)9　(C)12
(D)15　(E)上述答案都不对

15. 在一个数的两端都再放上 2，这个数的增加值为 2 317。问原来这个数的各位数的和是多少？

(A)9　(B)8　(C)7
(D)6　(E)5

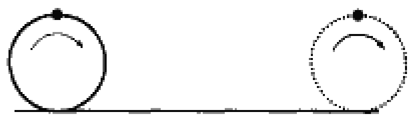
f. The average of a, b, c, and d is 10. The average of b, c, d, e and f is 14. If f is twice the value of a then the average of a and e is

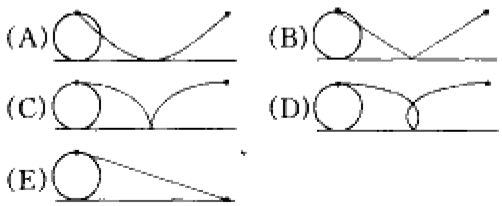
(A)10　(B)11　(C)12
(D)13　(E)15

12. Two athletes, Johnny and Sarah, are running in opposite directions on a track after they have started at the same point. Every time they meet one another, Sarah gives Johnny \$1. Sarah runs three times as fast as Johnny. The number of laps Sarah has to complete to make sure that Johnny collects \$120 is

(A)30　(B)40　(C)50
(D)60　(E)90

13. A coin with a mark on it as shown above is rolled without sliding along a straight line. The path the mark follows during one revolution is





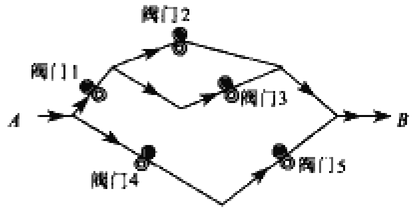
14. If the four digit integer $5ab4$ is a perfect square, then $a+b$ equals

(A)8　(B)9　(C)12
(D)15　(E)None of these

15. By placing a 2 at both ends of a number, the number's value is increased by 2 317. The sum of the digits of the original number is

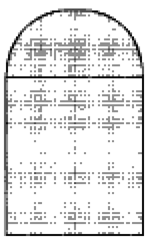
(A)9　(B)8　(C)7
(D)6　(E)5

16. 如图所示,水通过管道网 A 输送到 B。管道网一共有 5 个阀门,阀门可以是开或关,即可以让水流通过也可以不让水流通过。5 个阀门的开或关一共有 $2^5=32$ 个不同组合。问这 32 个不同的组合中有多少个组合可以让水从 A 流到 B?



(A)17　(B)16　(C)15
(D)14　(E)13

17. 如图所示,一窗户由一个半圆和一个长方形组成。若整个窗户的面积是 1 平方米,问半圆的半径是多少米?



(A)$\frac{1}{\sqrt{\frac{\pi}{4}+1}}$

(B)$\frac{1}{\sqrt{\pi+4}}$

(C)$\sqrt{\frac{2}{2+\pi}}$

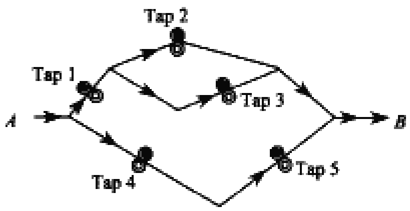
(D)$\sqrt{\frac{2}{\pi+8}}$

(E)上述答案都不对

18. 介于 100 至 1 000 的整数中有多少个数其各位数的和等于 7?
(A)8　(B)28　(C)36
(D)64　(E)上述答案都不对

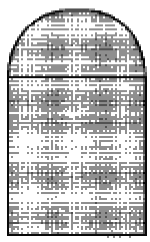
19. A,B,C 3 个女孩进行 100 米赛跑。A 到达终点时,B 落后 A 10 米,B 到达终点时,C 落后 B 20 米。问 A 到达终点时,C 落后 A 多少米?

16. Water flows through a network of pipes in the direction shown in the diagram from A to B. Five taps are on the network as shown. Each tap can be opened or closed to let water through or to stop the flow of the water. There are $2^5=32$ different ways of setting the taps. How many of these 32 ways will allow water to flow from A to B?



(A)17　(B)16　(C)15
(D)14　(E)13

17. A window made up of a semicircle and a square is represented in the figure below. What is the radius of the semicircle if the total area of the window is 1 m^2?



(A)$\frac{1}{\sqrt{\frac{\pi}{4}+1}}$

(B)$\frac{1}{\sqrt{\pi+4}}$

(C)$\sqrt{\frac{2}{2+\pi}}$

(D)$\sqrt{\frac{2}{\pi+8}}$

(E)None of these

18. For how many integers between 100 and 1 000 will the sum of the digits be 7?
(A)8　(B)28　(C)36
(D)64　(E)None of these

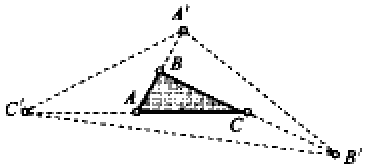
19. Three girls A, B and C run in a 100 m race. When A finishes, B is 10 m behind A and when B finishes C is 20 m behind B. How far in

（设她们赛跑的速度都是恒定的）

(A)30　(B)29.5　(C)29

(D)28.5　(E)28

20. $\triangle ABC$ 的面积为 25 平方厘米。若如图所示再形成一较大的$\triangle A'B'C'$，并且 $A'B=AB$，$CB'=BC$，$C'A=AC$。问$\triangle A'B'C'$的面积是多少？



(A)50 平方厘米　(B)150 平方厘米

(C)175 平方厘米　(D)200 平方厘米

(E)上述答案都不对

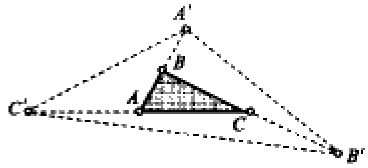
metres was C from A when A finished?

(Let's assume all the athletes run at a constant speed)

(A)30　(B)29.5　(C)29

(D)28.5　(E)28

20. Triangle ABC has an area of 25 cm^2. If a larger triangle $A'B'C'$ is formed as shown, knowing that the lengths $A'B=AB$, $CB'=BC$ and $C'A=AC$, what is the area of triangle $A'B'C'$?



(A)$50cm^2$　(B)$150cm^2$

(C)$175cm^2$　(D)$200cm^2$

(E)None of these

试　卷　六

Test　6

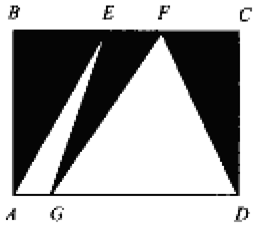
1. 计算$\frac{1+\sqrt{2}}{1-\sqrt{2}}+\frac{1-\sqrt{2}}{1+\sqrt{2}}$的值。

(A) -6　(B) $\frac{\sqrt{2}}{2}$　(C) $\sqrt{2}$
(D) 6　(E)上述答案都不对

2. 42 和 n 的最小公倍数为 462。问 n 不能等于多少？

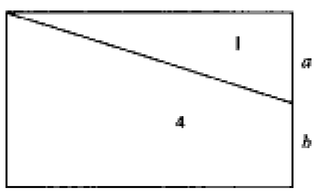
(A)33　(B)66　(C)88
(D)231　(E)462

3. 在长方形 $ABCD$ 中，$AD=12$ 厘米，$AB=7$ 厘米，$EF=5$ 厘米。问阴影部分的面积是多少平方厘米？



(A)42　(B)35
(C)49　(D)56
(E)不能确定

4. 图中的斜线将长方形分成两部分，两部分的面积之比为 1∶4。问 $a:b$ 等于多少？



(A)1∶1　(B)1∶2　(C)1∶3
(D)1∶4　(E)2∶3

5. 数 1 至 1 000 中，问有多少个是 3 的倍数，但不是 5 的倍数？

(A)123　(B)200　(C)267
(D)334　(E)上述答案都不对

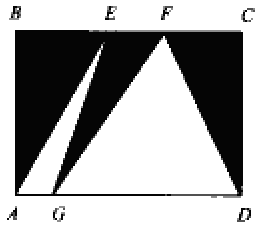
1. What is the value of $\frac{1+\sqrt{2}}{1-\sqrt{2}}+\frac{1-\sqrt{2}}{1+\sqrt{2}}$?

(A) -6　(B) $\frac{\sqrt{2}}{2}$　(C) $\sqrt{2}$
(D) 6　(E) None of these

2. The LCM of 42 and n is 462. Then n cannot be

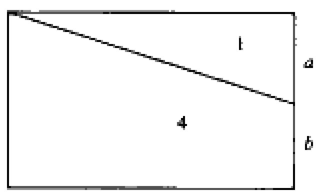
(A)33　(B)66　(C)88
(D)231　(E)462

3. In rectangle $ABCD$, $AD=12$ cm, $AB=7$ cm and $EF=5$ cm. The black area, in cm^2, is



(A)42　(B)35
(C)49　(D)56
(E) Impossible to find with the given information

4. In the diagram, the sloping line divides the area of the rectangle in the ratio 1∶4. What is the ratio $a:b$?



(A)1∶1　(B)1∶2　(C)1∶3
(D)1∶4　(E)2∶3

5. Of the whole numbers 1 to 1 000 inclusive, how many are multiples of 3 but not multiples of 5?

(A)123　(B)200　(C)267
(D)334　(E) None of these

6. 由于观看英式足球比赛的人不多，所以决定门票比上一场减价 20%，结果这场比赛比上一场多售出了 20%的门票。与上一场门票收入相比，问这一场门票收入有什么变化？

(A)增加了 20%　　(B)减少了 20%

(C)增加了 4%　　(D)减少了 4%

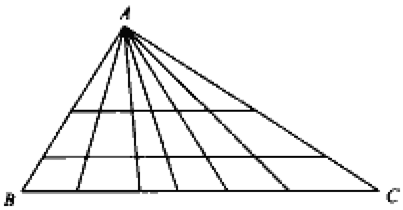
(E)持平

7. 一个盒子中有 80 个块体，一些块体是木头做的，一些块体是塑料做的。每个块体要涂上红色或绿色。若有 48 个块体由木头做的，有 32 个块体为红色，问绿色塑料做的块体最多有多少个？

(A)16　　(B)24　　(C)32

(D)48　　(E)上述答案都不对

8. 包括$\triangle ABC$，问图中一共有多少个三角形？



(A)21　　(B)42　　(C)63

(D)84　　(E)105

9. 计算 $2-4+6-8+10-12+14-\cdots-100$ 的值。

(A) -50　　(B)0　　(C)50

(D)100　　(E)上述答案都不对

10. 4 个小孩发现一个装玻璃球的袋子，并准备把玻璃球分掉。每个小孩分得的球数不同，分得的球数也不可能是其他小孩的两倍以上。问袋子中至少装有多少个玻璃球？

(A)10　　(B)15　　(C)18

(D)21　　(E)上述答案都不对

6. As a result of poor attendance at soccer matches it was decided to decrease the ticket price by 20%. At the next match the number of tickets sold increased by 20%. Compared to the previous match, the income from the sale of tickets

(A) increased by 20%　　(B) decreased by 20%

(C) increased by 4%　　(D) decreased by 4%

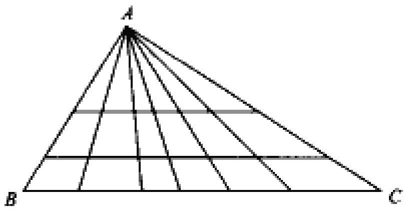
(E) remained the same

7. A box contains 80 blocks, some of which are wood and some made of plastic. Each block is coloured with one of the colours red or green. If 48 of the blocks are made of wood and if 32 of the blocks are red, what is the largest possible number of green plastic blocks?

(A)16　　(B)24　　(C)32

(D)48　　(E)None of these

8. The total number of different triangles in the diagram, including $\triangle ABC$, is



(A)21　　(B)42　　(C)63

(D)84　　(E)105

9. What is the value of $2-4+6-8+10-12+14-\cdots-100$?

(A) -50　　(B)0　　(C)50

(D)100　　(E)None of these

10. Four children find a bag of marbles and divide them among themselves. Each child takes a different number of marbles and no child has more than twice as many marbles as anyone else. The smallest possible number of marbles in the bag was

(A)10　　(B)15　　(C)18

(D)21　　(E)None of these

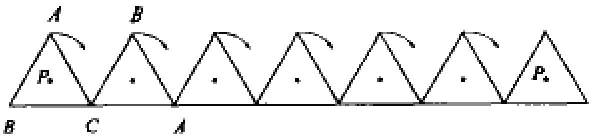
11. 我们定义运算“·”如下：$a \cdot b = a \times b + a - b$。计算表达式$(2\cdot5)\cdot(5\cdot2)$的值：

(A)81 (B)113 (C)117
(D)169 (E)上述答案都不对

12. 一个三位数，个位数为 x、十位数为$(x-1)$、百位数为$\frac{1}{2}x$。问这个数怎样用 x 表示？

(A)$5x-1$ (B)$7x-1$ (C)$111x-1$
(D)$61x-10$ (E)$\frac{5}{2}x-1$

13. ABC 为木质的等边三角形块，P 是三角形的中心，三角形沿一平面按顺时针方向滚动，并且每次都有一条边与平面接触。若 $PC=2$，问图中 P 点运动的距离是多少？



(A)$12\sqrt{3}$ (B)2π (C)8π
(D)6π (E)$14\sqrt{3}$

14. 在一次数学考试中，有 18 个学生答对了第一道试题，有 23 个学生答对了第二道试题，有 8 个学生答对了这两道试题，有 11 个同学两道试题都没有答对。问一共有多少学生参加了考试？

(A)41 (B)44 (C)49
(D)52 (E)60

15. 从数列 1，2，3，4，…，500 中去除一些数后形成一新数列，要求新数列中任何两个数的和都不是 7 的倍数。问新数列中最大的数是多少？

(A)216 (B)217 (C)213
(D)287 (E)284

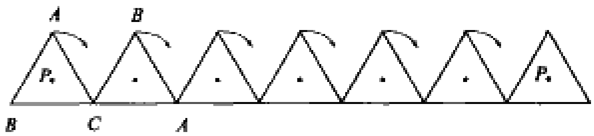
11. We define the operation “·”as follows: $a \cdot b = a \times b + a - b$. What is the value of the expression $(2\cdot5)\cdot(5\cdot2)$?

(A)81 (B)113 (C)117
(D)169 (E)None of these

12. A 3-digit number has x as its units digit, $(x-1)$ as the tens digit and $\frac{1}{2}x$ as its hundreds digit. The number in terms of x is

(A)$5x-1$ (B)$7x-1$ (C)$111x-1$
(D)$61x-10$ (E)$\frac{5}{2}x-1$

13. ABC is a wooden equilateral triangular block with P as its centre. The block is rolled clock wise on a flat surface such that one side touches the surface each time it is rolled.
If $PC=2$ units, what is the length of the path of object P in the above diagram?



(A)$12\sqrt{3}$ (B)2π (C)8π
(D)6π (E)$14\sqrt{3}$

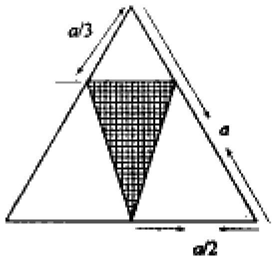
14. During a mathematics test, 18 students answered question 1 correctly, 23 students answered question 2 correctly, 8 students got them both correct and 11 students answered incorrectly on both questions. How many students took the test?

(A)41 (B)44 (C)49
(D)52 (E)60

15. From the numbers 1, 2, 3, 4, …, 500 a sequence is formed by deleting numbers so that no two remaining numbers have a sum which is a multiple of 7. The maximum number of numbers in this sequence is

(A)216 (B)217 (C)213
(D)287 (E)284

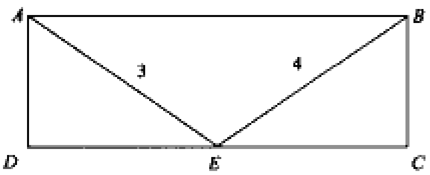
16. 下图中阴影三角形的面积是 $2\sqrt{3}$。若大三角形和上部的小三角形都是等边三角形，问 a 的值是多少？



(A)2　　(B)2.5　　(C)3
(D)6　　(E)上述答案都不对

17. 一些尺寸为 $1\times1\times1$ 的立方体被用于建一空心的 $10\times10\times10$ 的立方体。空心立方体的壳为两个小立方体厚。问需要多少小立方体？
(A)750　　(B)784　　(C)792
(D)800　　(E)上述答案都不对

18. 下图 $ABCD$ 为一长方形，E 是 DC 上的一点，且 $AE=3, BE=4, AE\perp BE$。问长方形 $ABCD$ 的面积是多少？

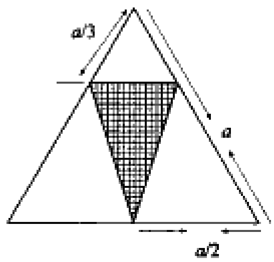


(A)8　　(B)10　　(C)12
(D)14　　(E)上述答案都不对

19. 数列 $1,\frac{4}{3},2,\frac{16}{5},\frac{16}{3},\frac{64}{7},\cdots$ 的下一项是多少？
(A) $\frac{128}{9}$　　(B) $\frac{92}{5}$　　(C)16
(D) $\frac{108}{7}$　　(E)上述答案都不对

20. 计算 $1+2-3-4+5+6-7-8+9+\cdots-99-100$ 的值。
(A) -100　　(B)0　　(C)1
(D)100　　(E)上述答案都不对

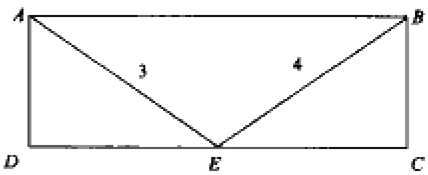
16. In the figure below, the area of the shaded triangle is $2\sqrt{3}$. If the large triangle and the small upper triangle are equilateral, what is the value of a?



(A)2　　(B)2.5　　(C)3
(D)6　　(E)None of these

17. A set of $1\times1\times1$ cubes is used to construct a hollow $10\times10\times10$ cube whose shell is two layers of cubes in thickness. How many cubes are needed?
(A)750　　(B)784　　(C)792
(D)800　　(E)None of these

18. Consider the rectangle $ABCD$ below. E is point on CD such that $AE=3, BE=4$ and $AE\perp BE$. The area of rectangle $ABCD$ is:



(A)8　　(B)10　　(C)12
(D)14　　(E)None of these

19. The next number in the sequence $1,\frac{4}{3},2,\frac{16}{5},\frac{16}{3},\frac{64}{7},\cdots$ is
(A) $\frac{128}{9}$　　(B) $\frac{92}{5}$　　(C)16
(D) $\frac{108}{7}$　　(E)None of these

20. What is the value of the sum
$1+2-3-4+5+6-7-8+9+\cdots-99-100$?
(A) -100　　(B)0　　(C)1
(D)100　　(E)None of these

试　卷　七

Test　7

1. 几年前，水泥输送车司机罢工 46 天。罢工前，司机每小时的工资是 7.5 美元，每年工作 260 天，每天 8 小时。问应增加多少工资才能在 1 年内弥补罢工的损失？

(A)$\frac{23}{1040}\times 100\%$　　(B)7.5%

(C)$\frac{23}{130}\times 100\%$　　(D)$\frac{69}{52}\times 100\%$

(E)上述答案都不对

2. 一汽车从 A 点到 B 点的速度为 40 千米/小时。问返程的速度是多少才能使来回的平均速度达到 50 千米/小时？

(A)50 千米/小时　　(B)58 千米/小时

(C)60 千米/小时　　(D)66 千米/小时

(E)信息不足

3. 自然数从 1 至 n 的乘积可以写成 $n!$。例如，$5! =1\times 2\times 3\times 4\times 5=120$。要使 $n!$ 可以被 990 整除，问 n 的最小值等于多少？

(A)9　　(B)10　　(C)11

(D)12　　(E)13

4. n 个数的平均值为 p，从这 n 个数中去除一个数 q，则余下数的平均值增加了 2。问数 q 等于多少？

(A)$p-2n$　　(B)$p-n+2$

(C)$2p-n$　　(D)$2p-n+2$

(E)$p-2n+2$

1. A few years ago, cement drivers were on strike for 46 days. Before the strike, these drivers earned \$7.50 per hour and worked 260 eight-hour days a year. What percentage increase is needed in yearly income to make up for the lost time within 1 year?

(A)$\frac{23}{1\,040}\times 100\%$　　(B)7.5%

(C)$\frac{23}{130}\times 100\%$　　(D)$\frac{69}{52}\times 100\%$

(E)None of these

2. An automobile travels from point A to point B at a speed of 40 km/h. how fast must it travel in the opposite direction to achieve an average speed of 50 km/h for the round trip?

(A)50 km/h　　(B)58 km/h

(C)60 km/h　　(D)66 km/h

(E)Not enough information

3. The product of all the natural numbers from 1 to n can be written as $n!$ For example $5! =1\times 2\times 3\times 4\times 5=120$. Find the smallest number n such that $n!$ is divisible by 990.

(A)9　　(B)10　　(C)11

(D)12　　(E)13

4. The mean(average)of n numbers is p. When the number q is removed from the list of numbers averaged, then the mean(average) increases by 2. The value of q is

(A)$p-2n$　　(B)$p-n+2$

(C)$2p-n$　　(D)$2p-n+2$

(E)$p-2n+2$

5. 定义 $a\times b=3a-2b$，计算 $(1\times(-2))\times(3\times4)$ 的值。

(A) -24　(B) -5　(C)5

(D)19　(E)上述答案都不对

6. 城市 A 和 B 相距 500 千米。一架飞机定期往返这两个城市。风总是以恒速从 A 向 B 吹。飞机不受风速影响的速度是 900 千米/小时。若飞机从 A 到 B 需 30 分钟，返程从 B 到 A 则需要 37.5 分钟，问风速是多少？

(A)80 千米/小时　(B)100 千米/小时

(C)120 千米/小时　(D)200 千米/小时

(E)上述答案都不对

7. 篮球比赛中，通过投球进筐可得 1 分，2 分和 3 分。一参赛队投球进筐 50 次，总得分为 80 分。问得 3 分的次数最多有多少？

(A)5　(B)10　(C)15

(D)20　(E)上述答案都不对

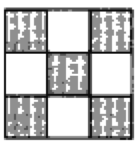
8. 一笔遗产由 5 个兄弟分。第一个人得到遗产的一半再加上 1 美元。第二个人得到余下的一半再加上 2 美元。第三个人得到再余下的一半再加 3 美元。第四个人得到再余下的一半再加 4 美元。第五个人得到 500 美元。问这笔遗产一共多少钱？

(A)7 098 美元　(B)7 598 美元

(C)8 098 美元　(D)8 598 美元

(E)9 098 美元

9. 小图中一共有 14 个正方形，问大图中一共有多少个正方形？



(A)49　(B)63

(C)77　(D)91

(E)105

5. Suppose that the operation $\times$ is defined by $a\times b=3a-2b$. What is the result of $(1\times(-2))\times(3\times4)$?

(A) -24　(B) -5　(C)5

(D)19　(E)None of these

6. The cities of A and B are a distance of 500 km from each other. An airplane regularly makes a round trip between them. The wind always blows at a constant velocity from A towards B. The speed of the airplane unmodified by the wind is 900 km/h. If the trip from A to B takes 30 minutes and the return trip takes $37\frac{1}{2}$ minutes, what is the velocity of the wind?

(A)80 km/h　(B)100 km/h

(C)120 km/h　(D)200 km/h

(E)None of these

7. In a basketball game, a team can score either 1, 2 or 3 points by throwing the ball through a hoop. Our team throws the ball through the hoop 50 times and scores 80 points. What is the largest possible number of 3-point throws our team made?

(A)5　(B)10　(C)15

(D)20　(E)None of these

8. An inheritance is split among 5 brothers. The first receives half of the inheritance plus \$1. The second receives half of the remainder plus \$2. The third receives half of the remainder plus \$3. The fourth receives half of the remainder plus \$4. The last brother receives \$500. What is the total amount of the inheritance?

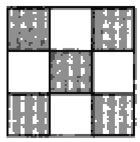
(A) \$7 098　(B) \$7 598

(C) \$8 098　(D) \$8 598

(E) \$9 098

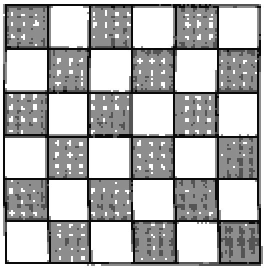
9. In this diagram, there is a total of 14 squares of all sizes.

What is the total number of squares of all sizes on the board below?



(A)49　(B)63　(C)77

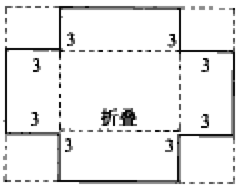
(D)91　(E)105



10. X 是大于1,并且除以2,3,4,5或6后的余数都是1的最小正整数。问 X 各位数的和是多少?

(A)4　(B)5　(C)6
(D)7　(E)10

11. 一公司设计产品的包装。一部分包装是一开口的盒子,由一正方形铝板在四个角上去掉四个边长为3厘米的正方形后折成(见图)。盒子的体积为75立方厘米。问要求铝板的尺寸是多少平方厘米?



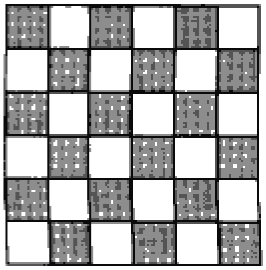
(A)6×6　(B)9×9　(C)10×10
(D)11×11　(E)上述答案都不对

12. 分数$\frac{53}{17}$可以表示为 $3+\cfrac{1}{x+\cfrac{1}{y}}$。若 x 和 y 均为整数,问 $x+y$ 等于多少?

(A)8　(B)9　(C)10
(D)11　(E)12

13. 从1写到1 000(包括1 000),需要用多少个数字?例如,从1写到10需要用11个数字。

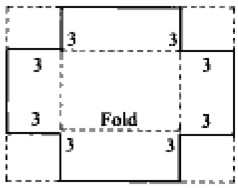
(A)2 889　(B)2 892　(C)2 893
(D)2 899　(E)2 989



10. X is the smallest positive integer larger than one such that the remainder is 1 when X is divided by any of the numbers 2, 3, 4, 5 or 6. The sum of the digits of X is

(A)4　(B)5　(C)6
(D)7　(E)10

11. A company is designing a package for its product. One part of the package is to be an open box made from a square piece of aluminium by cutting out a 3 cm square from each corner and folding up the sides (see Figure). The box is to contain 75 cm^3. What are the dimensions in cm x cm of the square piece of aluminium that must be used?



(A)6×6　(B)9×9　(C)10×10
(D)11×11　(E)None of these

12. The fraction $\frac{53}{17}$ can be expressed as $3+\cfrac{1}{x+\cfrac{1}{y}}$

If x and y are integers the value of $x+y$ is

(A)8　(B)9　(C)10
(D)11　(E)12

13. How many digits are needed to write all of the integers from 1 to 1 000 inclusive? For example, to write the numbers from 1 to 10 inclusive, one would need 11 digits.

(A)2 889　(B)2 892　(C)2 893
(D)2 899　(E)2 989

14. 李和帕加斯进行 100 米赛跑。若帕加斯先跑 10 米,李再起跑,帕加斯可以领先李 4 米到达终点。若要两人同时到达终点,问李只能让帕加斯先跑多少米(设赛跑中俩人均为恒速)?

(A)5.75 米　(B)5.9 米　(C)6.1 米
(D)6.25 米　(E)6.5 米

15. 计算$\frac{2^{2001}+2^{1999}}{2^{2000}-2^{1998}}$的值。

(A)2　(B)$\frac{10}{3}$　(C)$2^{1000}+1$
(D)$2^{2000}+1$　(E)上述答案都不对

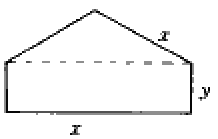
16. 一个正十二边形有多少对角线?正多边形的边长相等,两边夹角相等。对角线是任何两个顶角的连线,但是不包括正多边形的边。

(A)27　(B)35　(C)44
(D)54　(E)65

17. 定义两位数的"倒数"是将个位数与十位数对调(例如 34 是 43 的"倒数")。问有多少个两位数加上其"倒数"后是一个整数的平方?

(A)1　(B)4　(C)8
(D)9　(E)上述答案都不对

18. 一窗户由一个长方形和一个等腰三角形组成(见图)。若窗户的周长是 $6-\sqrt{3}$,窗户的面积是 $\frac{6-\sqrt{3}}{4}$,计算 $x+y$的值。



(A)$\frac{1+\sqrt{3}}{2}$　(B)$\frac{6+\sqrt{3}}{4}$　(C)$\frac{5-\sqrt{3}}{2}$
(D)$\frac{5+\sqrt{3}}{2}$　(E)上述答案都不对

19. 若只能向北、向东、向东北行进,问从 A 到 B 有

14. Lee gave Petrus a 10 metre lead in a 100 metre race and Lee was beaten by four metres.
What lead should Lee give Petrus in order that both finish the race together, if their respective speeds stayed the same in both races?

(A)5.75 m　(B)5.9 m　(C)6.1 m
(D)6.25m　(E)6.5m

15. The value of $\frac{2^{2001}+2^{1999}}{2^{2000}-2^{1998}}$ is

(A)2　(B)$\frac{10}{3}$　(C)$2^{1000}+1$
(D)$2^{2000}+1$　(E)None of these

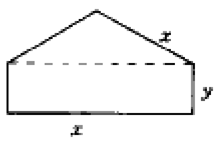
16. How many diagonals does a 12 - sided regular polygon have? A regular polygon has sides of equal length and equal angles where two sides meet. A diagonal is a line which connects any two corners of the polygon, but which is not a side of the polygon.

(A)27　(B)35　(C)44
(D)54　(E)65

17. If you define the inverse of a two digit integer to be the number obtained by permuting the two digits(for example, 34 is the inverse of 43), how many two-digit integers will produce a perfect square when added to their inverse?

(A)1　(B)4　(C)8
(D)9　(E)None of these

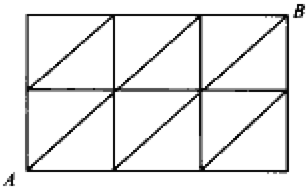
18. A window is formed by a rectangle topped by an equilateral triangle. If the perimeter is given by $6-\sqrt{3}$ and the area of the window is $\frac{6-\sqrt{3}}{4}$, find $x+y$.

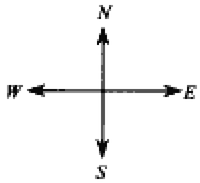


(A)$\frac{1+\sqrt{3}}{2}$　(B)$\frac{6+\sqrt{3}}{4}$　(C)$\frac{5-\sqrt{3}}{2}$
(D)$\frac{5+\sqrt{3}}{2}$　(E)None of these

19. How many distinct paths lead from A to B if the

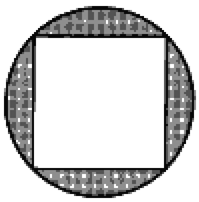
多少不同的路径?





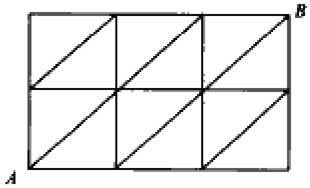
(A)15　　(B)20　　(C)25
(D)30　　(E)上述答案都不对

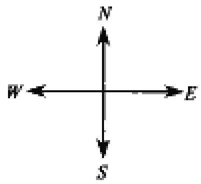
20. 问正方形外阴影部分的面积是整个圆面积的几分之几?



(A)$\frac{\pi}{2}$　　(B)$\frac{2}{\pi}$
(C)$\frac{\pi-2}{\pi}$　　(D)$\frac{1}{3}$
(E)从图中不能确定

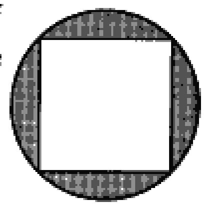
only possible directions are to go forward to the north, the east or the north-east?





(A)15　　(B)20　　(C)25
(D)30　　(E)None of these

20. What fraction of the area of the circle lies outside the square?



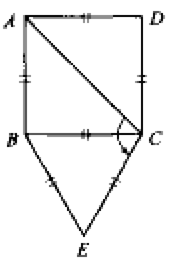
(A)$\frac{\pi}{2}$　　(B)$\frac{2}{\pi}$
(C)$\frac{\pi-2}{\pi}$　　(D)$\frac{1}{3}$
(E)Cannot be determined from this picture

试 卷 八

Test 8

1. 最后一次考试前莎迪的数学平均成绩为89%。她的最后一次考试成绩为97%，并且平均成绩上升到90%。问莎迪这一学期一共有多少次数学考试？
(A)5 (B)9 (C)7
(D)13 (E)8

2. 图中 $ABCD$ 为正方形，AC 为对角线，$\triangle BCE$ 为等边三角形。问 $\angle ACE$ 等于多少度？
(A)105° (B)60°
(C)90° (D)135°
(E)120°



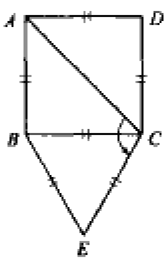
3. 平均速度由原定的72千米/小时改变为60千米/小时。问行程为120千米需多花多少分钟？
(A)12 (B)15 (C)20
(D)24 (E)30

4. 观察发现：$1.5\times1.5=2.25$
$2.5\times2.5=6.25$
$3.5\times3.5=12.25$
问下列哪个数的平方等于9 900.25？
(A)33.5 (B)66.5 (C)99.5
(D)100.5 (E)300.5

5. 应从7，12，15，21，27五个数中去掉哪个数，可使得余下四个数的平均值为15.25？
(A)7 (B)12 (C)15
(D)21 (E)27

1. Just before her last mathematics test this year Thandi's average mathematics mark was 89%. She scored 97% in the last test and her average is now 90%. The number of mathematics tests she wrote this year is
(A)5 (B)9 (C)7
(D)13 (E)8

2. In the diagram, $ABCD$ is a square with diagonal AC. $\triangle BCE$ is an equilateral triangle. The size of angle $\angle ACE$ is
(A)105° (B)60°
(C)90° (D)135°
(E)120°



3. The extra time, in minutes, that it would take to cover a distance of 120 km travelling at an average speed of 60 km/h instead of 72 km/h would be
(A)12 (B)15 (C)20
(D)24 (E)30

4. Observe: $1.5\times1.5=2.25$
$2.5\times2.5=6.25$
$3.5\times3.5=12.25$
The value of if × =9 900.25 is
(A)33.5 (B)66.5 (C)99.5
(D)100.5 (E)300.5

5. What number should be removed from the list so that the average of the remaining numbers is 15.25?
7, 12, 15, 21, 27
(A)7 (B)12 (C)15
(D)21 (E)27

6. 有 100 个问题的考试,答对 1 个得 9 分,答错 1 个倒扣 5 分。没有回答的问题不计人总分。问若总分为零分最多可回答多少问题?

(A)84 (B)90 (C)98
(D)99 (E)100

6. On a 100 question test, 9 points are given for each correct answer and 5 points deducted for each incorrect answer. Questions which are not answered are not included in the total score. What is the largest number of questions which can be answered to get a total score of 0?

(A)84 (B)90 (C)98
(D)99 (E)100

7. $3^{20}4^{30}-2$ 再除以 12 的余数是多少?

(A)1 (B)2 (C)4
(D)9 (E)10

7. What is the remainder when $3^{20}4^{30}-2$ is divided by 12?

(A)1 (B)2 (C)4
(D)9 (E)10

8. 音乐会的门票是儿童每张 5 美元、成人每张 16 美元。门票收入一共是 789 美元,问最多有多少人出席了音乐会?

(A)37 (B)38 (C)138
(D)149 (E)157

8. The entrance fee at a concert was \$5 per child and \$16 per adult. A total of \$789 was raised. The maximum number of people who could have attended the concert was

(A)37 (B)38 (C)138
(D)149 (E)157

9. 每周六合彩的数字是从 1,2,3,…,48,49 中任意抽出 6 个。莫非的父母买了一张彩票,号码为 2,17,26,29,30,43。开奖抽出的号码是 17,26,30,2 和 43。问下一个号码为 29 的概率是多少?

(A)$\frac{1}{2}$ (B)$\frac{1}{6}$ (C)$\frac{1}{30}$
(D)$\frac{1}{44}$ (E)$\frac{1}{49}$

9. In the weekly Lotto six different numbers are drawn randomly from the numbers 1, 2, 3, 4, … 48, 49, Mpho's parents bought a ticket with the numbers 2, 17,26,29,30,43 on it. The first five numbers drawn were 17,26,30,2 and 43. What is the chance that the next number drawn will be 29?

(A)$\frac{1}{2}$ (B)$\frac{1}{6}$ (C)$\frac{1}{30}$
(D)$\frac{1}{44}$ (E)$\frac{1}{49}$

10. 下列哪一个数值最大?

(A)$2^{10}3^5$ (B)2^{17} (C)4^8
(D)6^7 (E)3^9

10. Which of the following is the largest?

(A)$2^{10}3^5$ (B)2^{17} (C)4^8
(D)6^7 (E)3^9

11. 两个数的最小公倍数是 105,最大公约数是 5。问下列哪一项是这两个数的和?

(A)21 (B)25 (C)49
(D)50 (E)105

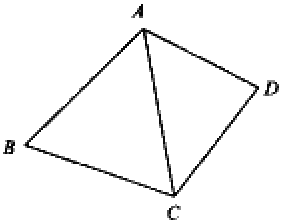
11. The least common multiple of two numbers is 105 and the greatest common divisor is 5. Which of the following could be the sum of the numbers?

(A)21 (B)25 (C)49
(D)50 (E)105

12. 一个浴盆有两个水龙头。水龙头 A 可以用 15 分钟灌满浴盆，水龙头 B 可以用 10 分钟灌满浴盆。问两个水龙头同时开需要用多少分钟才能灌满浴盆？

(A)6　(B)7.5　(C)8
(D)25　(E)信息不足

13. 图中 $AD = DC$，$AB = BC$，$\angle ABC = 60^\circ$，$\angle ADC = 82^\circ$。问$\angle BAD$ 是多少度？



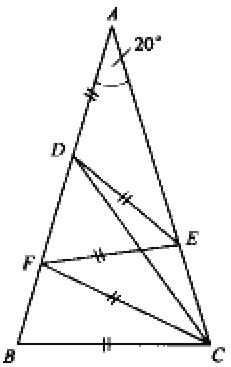
(A)107°　(B)109°　(C)110°
(D)111°　(E)上述答案都不对

14. 有一道加法题 $TSR + PSR + RSP$，桑巴用 4 个数 2，7，5 和 3 任意分别代替 4 个字母 T、S、R 和 P。问这时 $TSR + PSR + RSP$ 的最大值是多少？

(A)1 579　(B)1 499　(C)1 571
(D)1 701　(E)1 537

15. 如图所示，在$\triangle ABC$ 中，$\angle A = 20^\circ$，DE、DC、EF 和 FC 相连，并且 $AD = DE = EF = FC = BC$。问$\angle ACD$ 等于多少度？

(A)10°　(B)20°
(C)30°　(D)40°
(E)60°



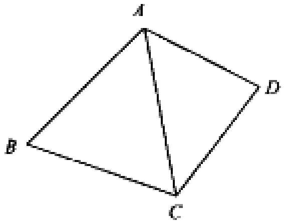
16. $1 - 2 - 3 + 4 + 5 - 6 - 7 + 8 + 9 \cdots + 76 + 77 - 78 - 79$等于多少？

(A)−98　(B)−80　(C)−60
(D)40　(E)80

12. A tub contains two faucets. Faucet A can fill the tub in 15 minutes and faucet B can fill the tub in 10 minutes. How long will it take to fill the tub using both faucets?

(A)6 min　(B)7.5 min　(C)8 min
(D)25 min　(E)Not enough information

13. In the figure, $AD = DC$, $AB = BC$, $\angle ABC = 60^\circ$ and $\angle ADC = 82^\circ$. What is the angle BAD in degrees?



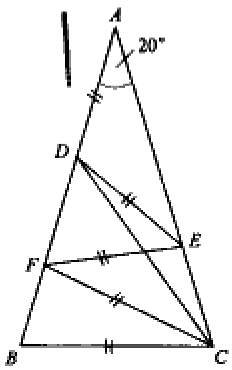
(A)107°　(B)109°　(C)110°
(D)111°　(E)None of these

14. In the addition problem $TSR + PSR + RSP$, Themba substitutes the four letters with the four digits 2, 7, 5, and 3, in any order. Different letters stand for different digits. The largest value of the sum $TSR + PSR + RSP$ is

(A)1 579　(B)1 499　(C)1 571
(D)1 701　(E)1 537

15. In the given figure $\triangle ABC$, $\angle A = 20^\circ$. DE, DC, EF and FC are joined such that $AD = DE = EF = FC = BC$. The size of $\angle ACD$ is

(A)10°　(B)20°
(C)30°　(D)40°
(E)60°



16. The value of the expression $1 - 2 - 3 + 4 + 5 - 6 - 7 + 8 + 9 \cdots + 76 + 77 - 78 - 79$ is equal to

(A)−98　(B)−80　(C)−60
(D)40　(E)80

17. $3^{2\,002}$的个位数是多少?

(A)1 (B)3 (C)5
(D)7 (E)9

18. 若 $x+y=5$, $x^2+y^2=111$, 问 x^3+y^3 等于多少?

(A)115 (B)227 (C)300
(D)555 (E)770

19. 莫日斯用两个两位数相乘。他不巧将一个数的个位数和十位数交换了位置,得到的结果比实际值大 3 015。问两位数之一是下列哪一个?

(A)23 (B)38 (C)45
(D)62 (E)81

20. 数学家奥古斯培斯·德·摩根生活在十九世纪。他曾说过:"在 x^2 年我的岁数是 x 岁。"问他是哪一年出生的?

(A)1801 (B)1806 (C)1849
(D)1860 (E)上述答案都不对

17. What is the last digit of $3^{2\,002}$?

(A)1 (B)3 (C)5
(D)7 (E)9

18. If $x+y=5$ and $x^2+y^2=111$, the value of x^3+y^3 is

(A)115 (B)227 (C)300
(D)555 (E)770

19. Maurice wants to multiply together two numbers composed of two digits each. Unfortunately, he reverses the digits of one of the numbers and obtains a result which is greater than the exact result by 3 015. Which one of the following could be one of the numbers?

(A)23 (B)38 (C)45
(D)62 (E)81

20. The mathematician Augustus De Morgan lived in the nineteenth century. He once made the following statement: "I was x years old in the year x^2." In what year was De Morgan born?

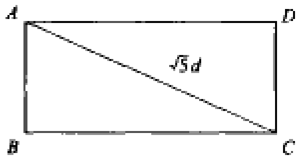
(A)1801 (B)1806 (C)1849
(D)1860 (E)None of these

试 卷 九

Test 9

1. $21^4=194\ 481$，问 0.21^4 等于多少?
   (A)0.000 194 481 (B)0.001 944 81
   (C)0.194 481 (D)19.448 1
   (E)1 944.81

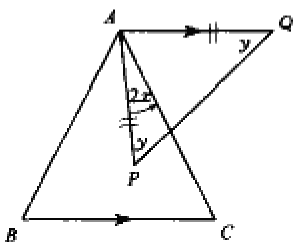
2. $ABCD$ 为长方形，$AD=2AB$。若 $AC=\sqrt{5}d$，问长方形的周长等于多少?



   (A)$4\sqrt{5}d$ (B)$6\sqrt{5}d$ (C)$10d$
   (D)$6d$ (E)$8d$

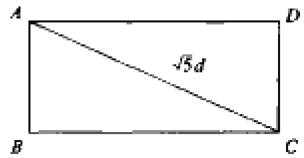
3. 两个朋友帕特利斯和萨姆的零花钱的比例为3:5。若每个人都花掉30美元，则零花钱的比例变为1:2。问两个人最初的零花钱一共有多少美元?
   (A)210 (B)240 (C)270
   (D)300 (E)330

4. 图中$\triangle ABC$ 为等边三角形，$\triangle APQ$ 为等腰三角形，且 $AQ=AP$，$AQ /\!/ BC$。若$\angle PAC=2x$，问$\angle Q$ 等于多少?



1. Given that $(21)^4=194\ 481$ then $(0.21)^4$ equals
   (A)0.000 194 481 (B)0.001 944 81
   (C)0.194 481 (D)19.448 1
   (E)1 944.81

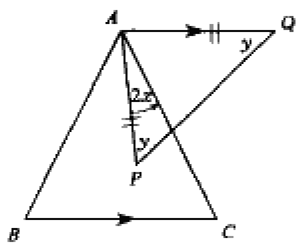
2. $ABCD$ is a rectangle such that $AD=2AB$. If $AC=\sqrt{5}d$, then the perimeter of $ABCD$ is



   (A)$4\sqrt{5}d$ (B)$6\sqrt{5}d$ (C)$10d$
   (D)$6d$ (E)$8d$

3. Two friends, Petros and Sam have pocket money in the ratio 3 : 5. Each one spends \$30. The ratio changes to 1 : 2. The total amount the two friends started off with is
   (A) \$210 (B) \$240 (C) \$270
   (D) \$300 (E) \$330

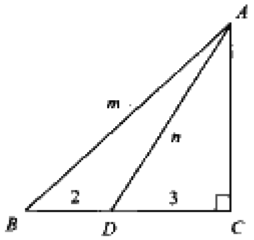
4. In the above diagram, $\triangle ABC$ is equilateral. $\triangle APQ$ is isosceles with $AQ=AP$ and $AQ /\!/ BC$. If $\angle PAC=2x$, then the size of $\angle Q$ in terms of x is



(A)$60^\circ + x$　　(B)$180^\circ + 3x$　　(C)$120^\circ - x$
(D)$2x$　　(E)$60^\circ - x$

5. 若 $x+y=4$，$y+z=7$，且 $x+z=5$，问 $(x+y+z)^2$ 等于多少？
(A)36　　(B)64　　(C)100
(D)144　　(E)256

6. D 点在$\triangle ABC$ 的 BC 边上，并且 $BD=2$，$DC=3$，若 $AB=m$，$AD=n$，问 m^2-n^2 等于多少？



(A)4　　(B)9　　(C)16
(D)25　　(E)36

7. 问 $1\times2\times3\times\cdots\times199\times200$ 得到的乘积的尾数有多少个零（注：210 100 有 2 个零）？
(A)42　　(B)43　　(C)46
(D)49　　(E)52

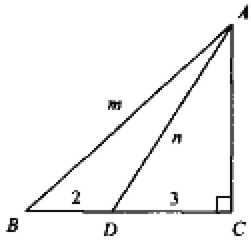
8. 一个三位数，第一位数是偶数，第二位数比第一位数小 6，第三位数比第一位数小 3。若这个数不能被 5 整除，这三位数的和是多少？
(A)9　　(B)11　　(C)12
(D)15　　(E)上述答案都不对

9. 每只雄蜜蜂仅有单亲母亲，而每只雌蜜蜂则有父、母亲。问第十代雄峰有多少个祖先？
(A)89　　(B)144　　(C)10
(D)512　　(E)233

(A)$60^\circ + x$　　(B)$180^\circ + 3x$　　(C)$120^\circ - x$
(D)$2x$　　(E)$60^\circ - x$

5. If $x+y=4$, $y+z=7$ and $x+z=5$ the value of $(x+y+z)^2$ is
(A)36　　(B)64　　(C)100
(D)144　　(E)256

6. $\triangle ABC$ has D on BC such that $BD=2$ and $DC=3$. If $AB=m$ and $AD=n$ then the value of m^2-n^2 is



(A)4　　(B)9　　(C)16
(D)25　　(E)36

7. If $1\times2\times3\times\cdots\times199\times200$ is calculated, then the number of zeros at the end of the product is
(A)42　　(B)43　　(C)46
(D)49　　(E)52

8. An integer is composed of three digits. The first digit is even. The second digit is six less than the first digit. The third digit is three less than the first. If the integer is not divisible by five, what is the sum of the three digits?
(A)9　　(B)11　　(C)12
(D)15　　(E)None of these

9. Each male honey-bee has a single female parent whilse each female honey-bee has both a male and a female parent. In the 10th generation back, only, how many ancestors does a male honey-bee have?
(A)89　　(B)144　　(C)10
(D)512　　(E)233

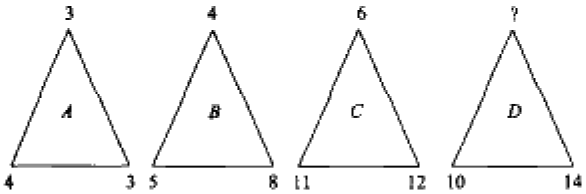
10. 有 20 个边长为 1 厘米的立方体块，表面均为白色。有 44 个边长为 1 厘米的立方体块，表面均为蓝色。将这 64 个立方体块粘在一起形成一个大立方体。问大立方体的表面为白色的面积至少是多少平方厘米？

(A)20　　(B)16　　(C)14
(D)12　　(E)8

11. 下列哪一项的值最小？

(A)$\dfrac{2}{1-\frac{1}{3}}$　　(B)$\dfrac{2}{1+\frac{1}{3}}$　　(C)$\dfrac{3}{1+\frac{1}{2}}$
(D)$\dfrac{3}{1-\frac{1}{2}}$　　(E)$\dfrac{2}{\frac{1}{2}+\frac{1}{3}}$

12. 通过仔细观察，已推论出每个三角形相应的数值和所处的位置，但三角形 D 的顶点仍缺 1 个数，问这个数等于多少？



(A)9　　(B)8　　(C)7
(D)6　　(E)5

13. 吉尼西将一个两位数减去其个位数和十位数的和。问下列哪一个数可能是计算结果？

(A)42　　(B)49　　(C)55
(D)63　　(E)信息不足

14. 两个数的最大公约数和最小公倍数的乘积为 384。若最大公约数和最小公倍数两个数中 1 个比另 1 个大 8，问两个数的和是多少？

(A)48　　(B)40　　(C)36
(D)24　　(E)18

15. 计算 $100^2-98^2+96^2-94^2+\cdots+8^2-6^2+4^2-2^2$ 的值。

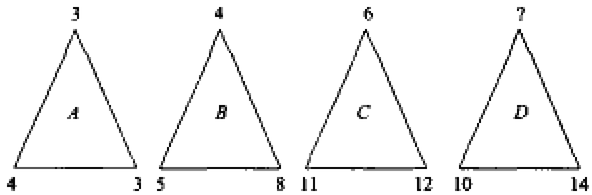
10. Twenty 1 centimetre cubes all have white sides. Forty four 1 centimetre cubes all have blue sides. These 64 cubes are glued together to form one large cube. What is the minimum surface area that could be white?

(A)20　　(B)16　　(C)14
(D)12　　(E)8

11. Which of the following is the smallest?

(A)$\dfrac{2}{1-\frac{1}{3}}$　　(B)$\dfrac{2}{1+\frac{1}{3}}$　　(C)$\dfrac{3}{1+\frac{1}{2}}$
(D)$\dfrac{3}{1-\frac{1}{2}}$　　(E)$\dfrac{2}{\frac{1}{2}+\frac{1}{3}}$

12. After careful observation, the value and location of one number of every triangle is derived. Determine the missing number at the apex of triangle D.



(A)9　　(B)8　　(C)7
(D)6　　(E)5

13. Jonas takes a two-digit number and subtracts the sum of the digits from it. Which of the following answers is a possible result of the calculation?

(A)42　　(B)49　　(C)55
(D)63　　(E)Not enough information

14. The product of the *HCF* and *LCM* of two numbers is 384. If one number is 8 more than the other number, then the sum of the two numbers is

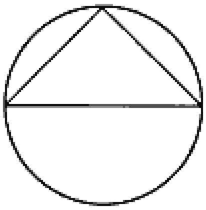
(A)48　　(B)40　　(C)36
(D)24　　(E)18

15. The value of
$100^2-98^2+96^2-94^2+\cdots+8^2-6^2+4^2-2^2$ is

(A)5 200　(B)5 100　(C)5 000
(D)4 900　(E)4 800

16. 6^{13}除以 7,余数是多少?
(A)0　(B)1　(C)3
(D)4　(E)6

17. 一等腰三角形与一半径为 12 的圆相切,三角形的底边与圆的直径重合。问三角形的面积是多少?

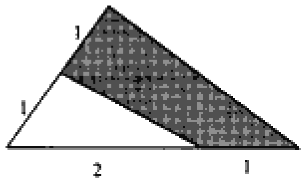


(A)18　(B)36
(C)72　(D)144
(E)288

18. 一个"英文字"可以是任何字母的组合。问用字母 A,B,B,C,C,C 可以组成多少个包括 3 个字母的"英文字"? 例如 ACC,CAB 和 CCA 都是组成的英文字。
(A)12　(B)13　(C)16
(D)18　(E)19

19. 计算 $1^2-2^2-3^2+4^2+5^2-6^2-7^2+8^2+\cdots+24^2$ 的和。
(A)24　(B)48　(C)576
(D)4 900　(E)上述答案都不对

20. 问阴影部分的面积是大三角形面积的几分之几?

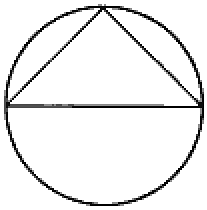


(A)$\frac{1}{3}$　(B)$\frac{1}{2}$　(C)$\frac{3}{5}$
(D)$\frac{2}{3}$　(E)信息不足

(A)5 200　(B)5 100　(C)5 000
(D)4 900　(E)4 800

16. What is the remainder when 6^{13} is divided by 7?
(A)0　(B)1　(C)3
(D)4　(E)6

17. An isosceles triangle is inscribed in a circle of radius 12 so that one side of the triangle passes through the center of the circle. What is the area of the triangle?

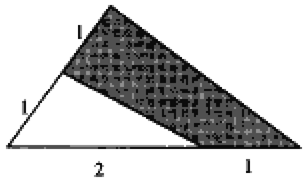


(A)18　(B)36
(C)72　(D)144
(E)288

18. A "word" is any sequence of letters. How many words of three letters can we form using only the letters A, B, B, C, C, C? For example, ACC, CAB, and CCA are three such words.
(A)12　(B)13　(C)16
(D)18　(E)19

19. What is the sum of the series $1^2-2^2-3^2+4^2+5^2-6^2-7^2+8^2+\cdots+24^2$?
(A)24　(B)48　(C)576
(D)4 900　(E)None of these

20. What fraction of the area of the large triangle is shaded?

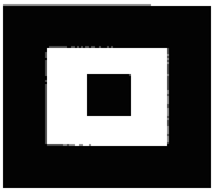


(A)$\frac{1}{3}$　(B)$\frac{1}{2}$　(C)$\frac{3}{5}$
(D)$\frac{2}{3}$　(E)Not enough information

试 卷 十

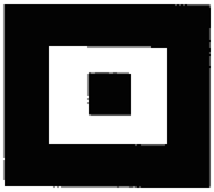
Test 10

1. 问图形中阴影部分的面积是多少？三个正方形的边长分别为 3,5 和 7。



(A)24 (B)32
(C)33 (D)36
(E)上述答案都不对

1. What is the shaded area in the given figure? The three squares have sides of length 3,5 and 7.



(A)24 (B)32
(C)33 (D)36
(E)None of these

2. n 为自然数，问$\frac{100}{2n-1}$能得到的最大整数是多少？

(A)9 (B)7 (C)5
(D)3 (E)1

2. The maximum number of integer values that could be obtained from $\frac{100}{2n-1}$ where n is a natural number, is

(A)9 (B)7 (C)5
(D)3 (E)1

3. 一奥林匹克数学竞赛记分规则如下：答对一道 A 部分的试题得 4 分，答对一道 B 部分的试题得 5 分，答对一道 C 部分的试题得 6 分；答错一道试题扣 1 分；不回答得 0 分。A 部分有 5 道试题，B 部分有 10 道试题，C 部分有 5 道试题。杰西回答了试卷上的所有试题，并且在 A 部分答对 4 道，在 B 部分答对 7 道。若她的得分为 63，问在 C 部分答对了多少试题？

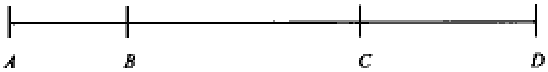
(A)1 (B)2 (C)3
(D)4 (E)5

3. In Mathematics Olympiad the scoring rules are as follows: For each correct answer in Part A: 4 marks,
in part B: 5 marks,
in Part C: 6 marks.
For each wrong answer: −1 mark.
For no answer: 0 marks.
There are five questions in Part A, ten questions in Part B and five questions in Part C.
Jessie answered every question on the paper. She had four Part A questions correct and seven Part B questions correct. How many Part C questions were correct if she scored 63 for the Olympiad?

(A)1 (B)2 (C)3
(D)4 (E)5

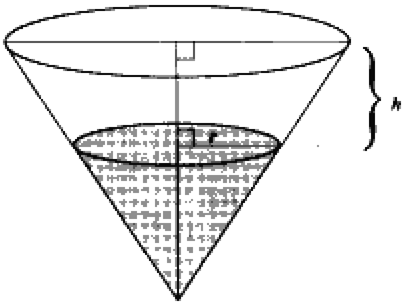
4. 图中 $AB:BC=1:3$，$BC:CD=5:8$，问 $AC:CD$ 等于多少？

4. In the diagram, $AB:BC=1:3$ and $BC:CD=5:8$. The ratio $AC:CD$ in the sketch is



(A)3:4　　(B)3:5　　(C)5:6
(D)4:5　　(E)2:3

5. 一个倒圆锥水箱中盛有一些液体。液体表面到锥顶圆面的高度 $h=21-\frac{7}{2}r$（米），r 为液体表面圆的半径。问锥顶圆面的周长是多少米？

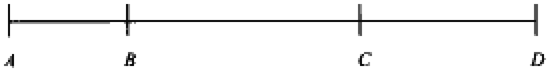


(A)9π　　(B)12π　　(C)15π
(D)18π　　(E)21π

6. 阿尔弗雷斯用 2 小时清理道路，比特利西仅用 1 小时就可以清理道路。若两人一起清理，则需要多少分钟结束工作？
(A)24　　(B)30　　(C)40
(D)45　　(E)上述答案都不对

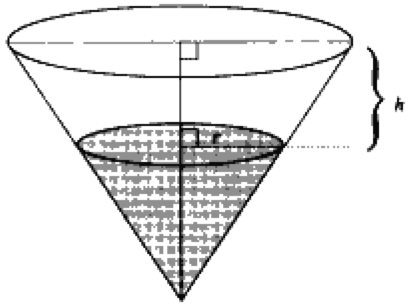
7. 数列 1, 2, 3, 4, 6, 9, 13, 19, 28, …的下一项是多少？
(A)37　　(B)39　　(C)41
(D)43　　(E)47

8. 早上 9 点保罗驾车按 40 千米/小时的速度从 A 城去 B 城。一段时间后，诺贝尔离开 B 城，并以 60 千米/小时的速度去 A 城。他们俩下午 1 点在两城市的中间点相遇。问诺贝尔是几点钟出发的？



(A)3:4　　(B)3:5　　(C)5:6
(D)4:5　　(E)2:3

5. A tank that is in the form of an inverted cone contains a liquid. The height h, in metres, of the space above the liquid is given by the formula $h=21-\frac{7}{2}r$ where r is the radius of the liquid surface, in metres. The circumference of the top of the tank, in metres is



(A)9π　　(B)12π　　(C)15π
(D)18π　　(E)21π

6. If Alphonse can shovel a walk in 2 hours and Beatrice can shovel the same walk in 1 hour. How many minutes will it take for them to shovel the walk together?
(A)24　　(B)30　　(C)40
(D)45　　(E)None of these

7. What is the next number in the sequence 1, 2, 3, 4, 6, 9, 13, 19, 28, …?
(A)37　　(B)39　　(C)41
(D)43　　(E)47

8. At 9:00 a.m. Paul starts driving from A city to B city at 40 km/h. Sometime later, Nabil leaves B city and drives at 60 km/h. They meet at the half-way point between the cities at 1:00 p.m.. At what time did Nabil start driving?

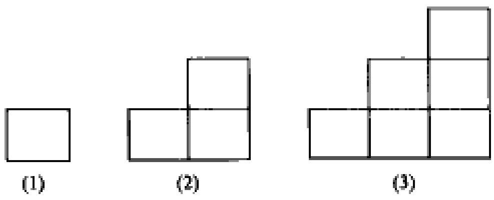
(A)上午 10 点　(B)上午 10 点 40 分
(C)中午 11 点　(D)中午 11 点 20 分
(E)上述答案都不对

9. 罗玛,鲍勃和罗杰买了一些红色和绿色的玻璃球,两种颜色的球的价格不同。为 4 个红球,2 个绿球,罗玛支付了 70 美分。为 2 个红球,5 个绿球,鲍勃支付了 95 美分。若仅买 1 个红球,1 个绿球,问罗杰要支付多少钱?
(A)5 美分　(B)10 美分　(C)20 美分
(D)25 美分　(E)27 美分

10. 若$\frac{19}{5}=1+\cfrac{x}{1+\cfrac{2}{1+\cfrac{3}{4}}}$,计算 x 的值。
(A)3　(B)4　(C)5
(D)6　(E)8

11. 你掷两个骰子,一个骰子有 10 个面,面上标的数是 1 到 10,另一个骰子有 8 个面,面上标的数是 1 到 8。问有多少种方法得到两个数的和为 10?
(A)8　(B)9　(C)10
(D)18　(E)80

12. 第一个图形由 4 根火柴棍构成,第二个图形由 10 根火柴棍构成,第三个图形由 18 根火柴棍构成,以此类推,问第 30 个图形由多少根火柴棍构成?



(A)900　(B)990　(C)1 080
(D)2 700　(E)3 000

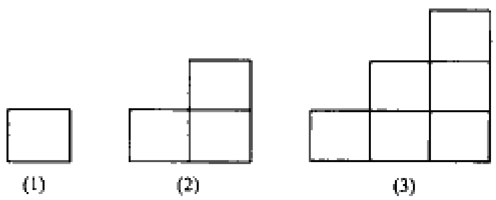
(A)10:00 am　(B)10:40 am
(C)11:00 am　(D)11:20 am
(E)None of these

9. Roman, Bob and Roger buy red and green marbles. Red and green marbles don't have the same price. Roman pays 70 ¢ for four red marbles and two green marbles. Bob pays 95 ¢ for two red marbles and five green marbles. How much will Roger pay if he buys one red marble and one green marble?
(A)5 ¢　(B)10 ¢　(C)20 ¢
(D)25 ¢　(E)27 ¢

10. Find the value of x if $\frac{19}{5}=1+\cfrac{x}{1+\cfrac{2}{1+\cfrac{3}{4}}}$.
(A)3　(B)4　(C)5
(D)6　(E)8

11. You throw two dice, one having 10 sides, labelled 1, 2, 3, ⋯, 10 and the other having 8 sides, labelled 1, 2, 3, ⋯, 8. In how many ways can you obtain a sum of 10?
(A)8　(B)9　(C)10
(D)18　(E)80

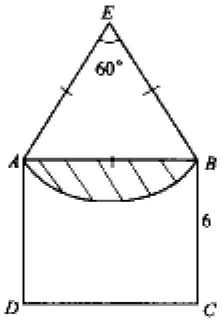
12. Four matchsticks are used to construct the first figure, 10 matchsticks for the second figure, 18 matchsticks for the third figure and so on.
How many matchsticks are needed to construct the 30th figure?



(A)900　(B)990　(C)1 080
(D)2 700　(E)3 000

13. 图中$\triangle EBA$为等边三角形。$ABCD$是边长为6的正方形。E是过A和B点圆弧的圆心。问阴影部分的面积是多少?

(A)$9\pi-\sqrt{27}$
(B)$6\pi-\sqrt{27}$
(C)$9\pi-3\sqrt{27}$
(D)$6\pi-3\sqrt{27}$
(E)$4\pi-3\sqrt{27}$

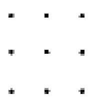


14. 图示为"非传统"魔力方格,对角线上4个数值的和为105。另外还有其他4个数值的和为105。问方格中一共有多少个不同的4个数值的和等于105?

12	19	28	35
16	23	32	39
18	25	34	41
13	20	29	36

(A)16　(B)18　(C)20
(D)22　(E)24

15. 连接图中任何两点,问有多少种不同的距离?点阵中相邻点的横向和纵向距离相等。



(A)5　(B)6　(C)7
(D)8　(E)上述答案都不对

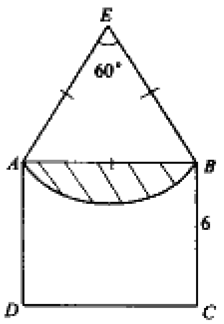
16. 有面值为1美分、5美分、10美分和25美分的硬币。问至少需要多少个硬币才能给出1美分至1美元的任何面值?(注:例如60美分需要2个25美分硬币、1个10美分硬币,则60美分面值需要3个硬币)。

(A)10　(B)11　(C)12
(D)15　(E)上述答案都不对

17. 计 算 $\left(1+\frac{1}{1}\right)\times\left(1+\frac{1}{2}\right)\times\left(1+\frac{1}{3}\right)\times$

13. In the diagram, $\triangle EBA$ is an equilateral triangle. $ABCD$ is a square of sides 6. E is the centre of the circle which passes through points A and B. The area of the shaded region is

(A)$9\pi-\sqrt{27}$
(B)$6\pi-\sqrt{27}$
(C)$9\pi-3\sqrt{27}$
(D)$6\pi-3\sqrt{27}$
(E)$4\pi-3\sqrt{27}$

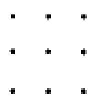


14. The diagram is a "non-traditional" magic square that totals 105. This total can be obtained by adding the 4 numbers along a diagonal. There are other sets of 4 numbers giving the same total. The maximum number of other combinations that give a total of 105 is

12	19	28	35
16	23	32	39
18	25	34	41
13	20	29	36

(A)16　(B)18　(C)20
(D)22　(E)24

15. If the distance is measured between any two of the points in the array given, how many distinct distances are possible? Adjacent points horizontally and vertically are the same distance apart.



(A)5　(B)6　(C)7
(D)8　(E)None of these

16. Using coins with values of 1¢, 5¢, 10¢ and 25¢, what is the smallest number of coins needed to be able to exactly make each total from 1¢ to \$1.00?

(A)10　(B)11　(C)12
(D)15　(E)None of these

17. Find the value of $\left(1+\frac{1}{1}\right)\times\left(1+\frac{1}{2}\right)\times$

$\left(1+\frac{1}{4}\right)\times\cdots\times\left(1+\frac{1}{2\,004}\right)$的值。

(A)0　　(B)2 004　　(C)2 005

(D)4 008　　(E)上述答案都不对

18. 问下列哪个数最大?

(A)$2^{2\,004}$　　(B)$2\,004^2$　　(C)$2\,000^4$

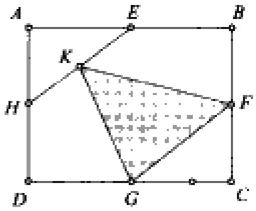
(D)$4^{2\,000}$　　(E)$2\times4\times2\,000\times2\,004$

19. 给你三个数。若三个数两两相加得到的结果分别为 23,32,39。问这三个数的和是多少?

(A)44　　(B)47　　(C)50

(D)94　　(E)上述答案都不对

20. E、F、G、H 是长方形 $ABCD$ 四个边的中点,K 是线段 HE 的中点。若长方形 $ABCD$ 的面积是 12 平方米,问$\triangle KFG$ 的面积是多少?



(A)2 平方米　　(B)3 平方米　　(C)4 平方米

(D)6 平方米　　(E)信息不足

$\left(1+\frac{1}{3}\right)\times\left(1+\frac{1}{4}\right)\times\cdots\times\left(1+\frac{1}{2\,004}\right)$

(A)0　　(B)2 004　　(C)2 005

(D)4 008　　(E)None of these

18. Find the largest number among these:

(A)$2^{2\,004}$　　(B)$2\,004^2$　　(C)$2\,000^4$

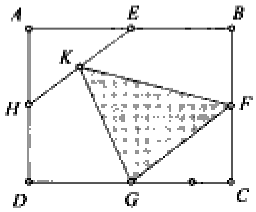
(D)$4^{2\,000}$　　(E)$2\times4\times2\,000\times2\,004$

19. You are given a set of three numbers. If the numbers are added together two at a time, the sums are 23,32 and 39. What is the sum of the three numbers?

(A)44　　(B)47　　(C)50

(D)94　　(E)None of these

20. E, F, G and H are the middle points of the sides of rectangle $ABCD$ and K is the middle point of segment HE. If the rectangle $ABCD$ has an area of 12 m^2, what is the area of the triangle KFG?



(A)$2m^2$　　(B)$3m^2$　　(C)$4m^2$

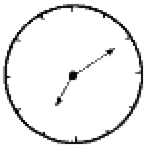
(D)$6m^2$　　(E)Not enough information

试卷十一

Test 11

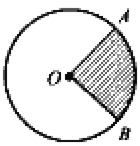
1. 问 2^n-2^{n-1} 等于多少？
   (A)2^{n-1}　(B)2^{2n-1}　(C)2
   (D)2^{2n}　(E)$\frac{1}{2}$

2. 艾米利坐在房间的一张椅子上。在她身后有一个钟，在她前面有一个镜子。如图所示是她看到的钟在镜子中的影像。问实际时间约是多少？



   (A)4:10　(B)7:10
   (C)5:10　(D)6:50
   (E)4:50

3. 在以 O 为圆心的圆中，阴影部分的面积为整个圆的面积的 20%。问$\angle AOB$ 的度数是多少？



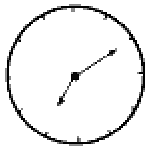
   (A)36°　(B)72°
   (C)90°　(D)80°
   (E)70°

4. 当一水壶盛有一半水时可倒满三个同样的大玻璃杯。若要正好倒满四个同样的大玻璃杯，问水壶中盛的水为几分之几？
   (A)$\frac{2}{3}$　(B)$\frac{7}{12}$　(C)$\frac{4}{7}$
   (D)$\frac{6}{7}$　(E)$\frac{3}{4}$

5. 一银行的职工向空的柜员机中装面值为 5 美元、10 美元和 20 美元的纸币。若每扎纸币为 100 张，柜员机中可装入各种面值的纸币各 10 扎，问

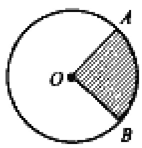
1. 2^n-2^{n-1} equals
   (A)2^{n-1}　(B)2^{2n-1}　(C)2
   (D)2^{2n}　(E)$\frac{1}{2}$

2. Emily sits on a chair in a room. Behind her is a clock. In front of her is a mirror. In the mirror, she sees the image of the clock as shown. The actual time is closest to



   (A)4:10　(B)7:10
   (C)5:10　(D)6:50
   (E)4:50

3. In the circle with centre O, the shaded sector represents 20% of the area of the circle. What is the size of angle AOB?



   (A)36°　(B)72°
   (C)90°　(D)80°
   (E)70°

4. When a pitcher is $\frac{1}{2}$ full it contains exactly enough water to fill three identical glasses. How full would the pitcher be if it had exactly enough water to fill four of the same glasses?
   (A)$\frac{2}{3}$　(B)$\frac{7}{12}$　(C)$\frac{4}{7}$
   (D)$\frac{6}{7}$　(E)$\frac{3}{4}$

5. A bank employee is filling an empty cash machine with bundles of \$5.00, \$10.00 and \$20.00 bills. Each bundle has 100 bills in it and the machine

一共需要多少钱才能装满柜员机?

(A)30 000 美元　　(B)25 000 美元

(C)35 000 美元　　(D)40 000 美元

(E)45 000 美元

6. 电梯的载重量限量为 1 500 千克。电梯中每个人的平均质量为 80 千克。若载人总质量已超过限量 100 千克,问电梯中有多少人?

(A)14　　(B)17　　(C)16

(D)20　　(E)13

7. 在如图所示的 4×4 方格中,每一横向、纵向和对角线方向上都应是 1,2,3,4 四个数。问 $K+N$ 的值是多少?

1	*F*	*G*	*H*
T	2	*J*	*K*
L	*M*	3	*N*
P	*Q*	1	*R*

(A)4　　(B)3

(C)5　　(D)6

(E)7

8. $N(x)$表示小于 x 的质数(如:$N(60)=59$),问 $N(N(30))$等于多少(记住 1 不是质数)?

(A)4　　(B)5　　(C)10

(D)23　　(E)29

9. 史迪夫在上午 10 点钟离家 60 千米的地方有一个约会。他行驶的速度是每小时 80 千米,但仍比约定时间晚了 20 分钟。问他是什么时间离开家的?

(A)上午 9 点 35 分　　(B)上午 9 点 15 分

(C)上午 8 点 40 分　　(D)上午 9 点

(E)上午 9 点 20 分

10. 米切尔从{1,2,3,4,5}这一组数中取了 3 个不同的数,并将这 3 个数放在$\square\frac{\square}{\square}$空格中形成一混合分数(混合分数的分数部分必须小于1,如

holds 10 bundles of each type. What amount of money is required to fill the machine?

(A) \$ 30 000　　(B) \$ 25 000

(C) \$ 35 000　　(D) \$ 40 000

(E) \$ 45 000

6. The weight limit for an elevator is 1 500 kilograms. The average weight of the people in the elevator is 80 kilograms. If the combined weight of the people is 100 kilograms over the limit, how many people are in the elevator?

(A)14　　(B)17　　(C)16

(D)20　　(E)13

7. In the 4×4 square shown, each row, column and diagonal should contain each of the numbers 1, 2, 3 and 4. Find the value of $K+N$.

1	*F*	*G*	*H*
T	2	*J*	*K*
L	*M*	3	*N*
P	*Q*	1	*R*

(A)4　　(B)3

(C)5　　(D)6　　(E)7

8. The notation $N(x)$ means the number of prime numbers less than x. What is the value of $N(N(30))$? (Remember that 1 is not a prime number.)

(A)4　　(B)5　　(C)10

(D)23　　(E)29

9. Stephen had a 10:00 a. m. appointment 60 km from his home. He averaged 80 km/h for the trip and arrived 20 minutes late for the appointment. At what time did he leave his home?

(A)9:35 a.m　　(B)9:15 a.m.

(C)8:40 a.m.　　(D)9:00 a.m.

(E)9:20 a.m.

10. Michael picks three *different* digits from the set {1, 2, 3, 4, 5} and forms a mixed number by placing the digits in the spaces of $\square\frac{\square}{\square}$. The

$4\frac{2}{3}$)。问可形成的最大混合分数与最小混合分数之间的差值是多少？

(A)$4\frac{3}{5}$　(B)$4\frac{9}{20}$　(C)$4\frac{3}{10}$

(D)$4\frac{4}{15}$　(E)$4\frac{7}{20}$

11. 假设 x^* 表示 $\frac{1}{x}$。例如，$5^*=\frac{1}{5}$。问下列有多少表达式是对的？

(Ⅰ)$2^*+4^*=6^*$ (Ⅱ)$3^*\times5^*=15^*$ (Ⅲ)$7^*-3^*=4^*$ (Ⅳ)$12^*\div3^*=4^*$

(A)0　(B)1　(C)2

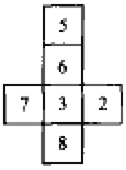
(D)3　(E)4

12. 在狂欢节的套圈游戏中，三个圈可套在三个桩上。圈套在 A 桩上得1分，套在 B 桩上得3分，套在 C 桩上得5分。若三个圈都能套住桩，问有多少种不同的得分？（一个桩上可套多个圈）

(A)12　(B)7　(C)10

(D)13　(E)6

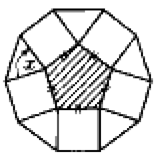
13. 图示可以折成一正方形，三个面也可在顶角相交。若三个相交面上的数相乘，问可能的最大值是多少？



(A)144　(B)168　(C)240

(D)280　(E)336

14. 正五边形的边和角都相等。如图所示一阴影的正五边形被正方形和三角形所包围，问角 x 是多少度？



(A)75°　(B)108°

(C)90°　(D)60°　(E)72°

fractional part of the mixed number must be less than 1. $\left(\text{For example}, 4\frac{2}{3}\right)$. What is the difference between the largest and smallest possible mixed number that can be formed?

(A)$4\frac{3}{5}$　(B)$4\frac{9}{20}$　(C)$4\frac{3}{10}$

(D)$4\frac{4}{15}$　(E)$4\frac{7}{20}$

11. Suppose that x^* means $\frac{1}{x}$, the reciprocal of x. For example, $5^*=\frac{1}{5}$. How many of the following statements are true?

(Ⅰ)$2^*+4^*=6^*$　(Ⅱ)$3^*\times5^*=15^*$

(Ⅲ)$7^*-3^*=4^*$　(Ⅳ)$12^*\div3^*=4^*$

(A)0　(B)1　(C)2

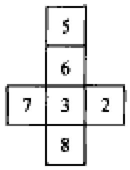
(D)3　(E)4

12. In a ring toss game at a carnival, three rings are tossed over any of three pegs. A ring over peg A is worth *one* point, over peg B *three* points and over peg C *five* points. If all three rings land on pegs, how many different point totals are possible? (It is possible to have more than one ring on a peg.)

(A)12　(B)7　(C)10

(D)13　(E)6

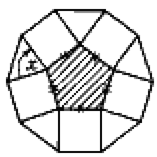
13. The figure shown is folded to form a cube. Three faces meet at each corner. If the numbers on the three faces at a corner are multiplied, what is the largest possible product?



(A)144　(B)168　(C)240

(D)280　(E)336

14. A regular pentagon has all sides and angles equal. If the shaded pentagon is enclosed by squares and triangles, as shown, what is the size of angle x?



(A)75°　(B)108°　(C)90°

(D)60°　(E)72°

15. 三张扑克牌放成一排。梅花被放在红桃和方块的右边。5 被放在红桃的左边。8 放在 4 的右边。问从左到右是下列哪三张牌?

(A)红桃 4、方块 5、梅花 8
(B)方块 5、红桃 4、梅花 8
(C)梅花 8、红桃 4、方块 5
(D)方块 4、梅花 5、红桃 8
(E)红桃 5、方块 4、梅花 8

16. 数 315 可以被表示成大于 1 的两个奇数的乘积,问有多少种不同的表示方法?

(A)0　(B)1　(C)3
(D)4　(E)5

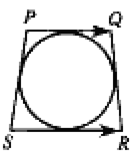
17. 111 222 333 444 555 666 777 888 999 除以 111,问得到的商有多少位数?

(A)8　(B)9　(C)10
(D)17　(E)25

18. 若三角形的三个边的长度分别为 30,40 和 50,问最短的高是多少?

(A)20　(B)24　(C)25
(D)30　(E)40

19. 梯形 $PQRS$ 中内接有一圆。若 $PS=QR=25$ 厘米,$PQ=18$ 厘米 $SR=32$ 厘米,问圆的半径是多少?



(A)14 厘米　(B)25 厘米
(C)24 厘米　(D) $\sqrt{544}$厘米
(E) $\sqrt{674}$厘米

20. 一笔钱由艾伦、比尔和卡罗 3 人分。艾伦得到 1 美元和余下的三分之一。然后比尔得到 6 美元和再余下的三分之一。最后卡罗得到余下的 40 美元。问比尔分得多少钱?

(A)26 美元　(B)28 美元　(C)30 美元
(D)32 美元　(E)34 美元

15. Three playing cards are placed in a row. The club is to the right of the heart and the diamond. The 5 is to the left of the heart. The 8 is to the right of the 4. From left to right, the cards are

(A)4 of hearts, 5 of diamonds, 8 of clubs
(B)5 of diamonds, 4 of hearts, 8 of clubs
(C)8 of clubs, 4 of hearts, 5 of diamonds
(D)4 of diamonds, 5 of clubs, 8 of hearts
(E)5 of hearts, 4 of diamonds, 8 of clubs

16. The number 315 can be written as the product of two odd integers each greater than 1. In how many ways can this be done?

(A)0　(B)1　(C)3
(D)4　(E)5

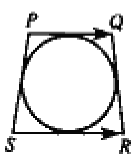
17. When the number 111 222 333 444 555 666 777 888 999 is divided by 111 then the number of digits in the quotient is

(A)8　(B)9　(C)10
(D)17　(E)25

18. If the sides of a triangle have lengths 30, 40 and 50, what is the length of the shortest altitude?

(A)20　(B)24　(C)25
(D)30　(E)40

19. A circle is inscribed in trapezoid $PQRS$. If $PS=QR=25$ cm, $PQ=18$ cm and $SR=32$ cm, what is the lengt'h of the diameter of the circle?



(A)14 cm　(B)25 cm　(C)24 cm
(D) $\sqrt{544}$ cm　(E) $\sqrt{674}$ cm

20. A sum of money is to be divided among Allan, Bill and Carol. Allan receives \$1 plus one-third of what is left. Bill then receives \$6 plus one-third of what remains. Carol receives the rest, which amounts to \$40. How much did Bill receive?

(A) \$26　(B) \$28　(C) \$30
(D) \$32　(E) \$34

试卷十二

Test 12

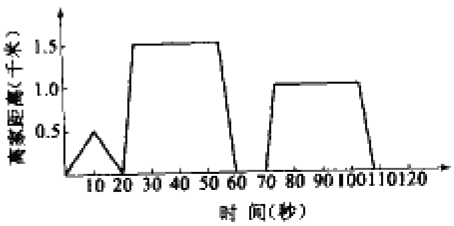
1. 在下列加法竖式中，不同的英文字母代表不同的数字，相同的英文字母则代表相同的数字。若 O 代表数字 7，问 U 代表哪一个数？

$$\begin{array}{r} TWO \\ +\ TWO \\ \hline =\ FOUR \end{array}$$

(A)5　　(B)6　　(C)4
(D)3　　(E)2

2. 若销售税从 7% 增至 7.5%，那么购买 1 000 美元的商品需要多付多少税？
(A)75.00 美元　(B)5.00 美元　(C)0.5 美元
(D)0.05 美元　(E)7.50 美元

3. 汤姆上午大部分时间都在访问朋友并一起玩。图表显示了他的行程。他去朋友家，若朋友在家就和朋友一起玩。问他在几家停留并且和朋友一起玩？



(A)1　　(B)2　　(C)3
(D)4　　(E)5

4. 399×501 最接近下列哪个数？
(A)250 000　(B)240 000　(C)200 000
(D)160 000　(E)150 000

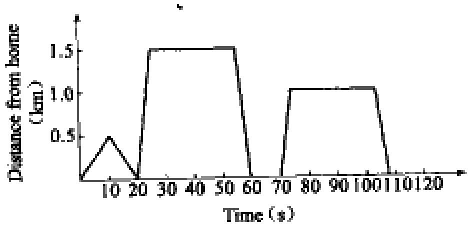
1. In this addition, different letters stand for different digits, but each letter represents the same digit each time it appears. If the letter O stands for 7, what digit must U represent?

$$\begin{array}{r} TWO \\ +\ TWO \\ \hline =\ FOUR \end{array}$$

(A)5　　(B)6　　(C)4
(D)3　　(E)2

2. If the sales tax rate were to increase from 7% to 7.5%, then the tax on a \$1 000 item would go up by
(A) \$75.00　(B) \$5.00　(C) \$0.5
(D) \$0.05　(E) \$7.50

3. Tom spent part of his morning visiting and playing with friends. The graph shows his travels. He went to his friends' houses and stopped to play if they were at home. The number of houses at which he stopped to play is



(A)1　　(B)2　　(C)3
(D)4　　(E)5

4. 399×501 is closest to
(A)250 000　(B)240 000　(C)200 000
(D)160 000　(E)150 000

5. 一个长方形花园的面积是 28 平方米。花园的长度为 7 米。问花园的周长是多少米?

(A)22　(B)11　(C)24　(D)36　(E)48

6. 计算$\frac{1\,996\times(1\,997^2-9)\times1\,998}{2\,000\times(1\,997^2-1)}$。

(A)1 994　(B)1 995　(C)1 996　(D)1 997　(E)1 998

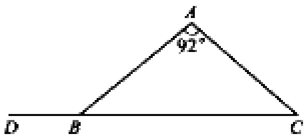
7. 如果$\frac{n+1\,999}{2}=-1$,那么 n 的值是多少?

(A)$-2\,001$　(B)$-2\,000$　(C)$-1\,999$　(D)$-1\,997$　(E)1 997

8. 表达式 $n!$ 是等于从 1 至 n 的所有正整数相乘。例如,$5!=1\times2\times3\times4\times5$。计算 $6!-4!$ 的值。

(A)2　(B)18　(C)30　(D)716　(E)696

9. 如图所示三角形 ABC 是一个等腰三角形,其中$\angle A=92^\circ$。将 CB 延长到D 点。问$\angle ABD$ 是多少度?



(A)88°　(B)44°　(C)92°　(D)136°　(E)158°

10. 计算

$\frac{1\times2\times4+2\times4\times8+3\times6\times12+\cdots+10\times20\times40}{1\times3\times9+2\times6\times18+3\times9\times27+\cdots+10\times30\times90}$。

(A)$\frac{1}{729}$　(B)$\frac{1}{27}$　(C)$\frac{8}{27}$　(D)1　(E)$\frac{2}{3}$

11. 在一组 5 个数中,前 2 个数的平均值为 12,后 3 个数的平均值为 7。问 5 个数的平均值是多少?

5. The area of a rectangular shaped garden is 28 m^2. It has a length of 7 m. Its perimeter, in metres, is

(A)22　(B)11　(C)24　(D)36　(E)48

6. $\frac{1\,996\times(1\,997^2-9)\times1\,998}{2\,000\times(1\,997^2-1)}$ equals

(A)1 994　(B)1 995　(C)1 996　(D)1 997　(E)1 998

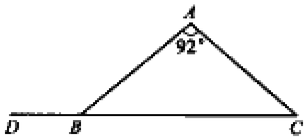
7. If $\frac{n+1\,999}{2}=-1$, then the value of n is

(A)$-2\,001$　(B)$-2\,000$　(C)$-1\,999$　(D)$-1\,997$　(E)1 997

8. The expression $n!$ means the product of the positive integers from 1 to n. For example, $5!=1\times2\times3\times4\times5$. The value of $6!-4!$ is

(A)2　(B)18　(C)30　(D)716　(E)696

9. ABC is an isosceles triangle in which $\angle A=92^\circ$. CB is extended to a point D. What is the size of $\angle ABD$



(A)88°　(B)44°　(C)92°　(D)136°　(E)158°

10. The value of

$\frac{1\times2\times4+2\times4\times8+3\times6\times12+\cdots+10\times20\times40}{1\times3\times9+2\times6\times18+3\times9\times27+\cdots+10\times30\times90}$ is

(A)$\frac{1}{729}$　(B)$\frac{1}{27}$　(C)$\frac{8}{27}$　(D)1　(E)$\frac{2}{3}$

11. In a set of five numbers, the average of two of the numbers is 12 and the average of the other three numbers is 7. The average of all five numbers is

(A)$8\frac{1}{3}$　(B)$8\frac{1}{2}$　(C)9

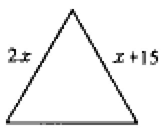
(D)$8\frac{3}{4}$　(E)$9\frac{1}{2}$

12. 在一减法题 $\begin{array}{r}1957\\-\quad a9\\\hline 18b8\end{array}$ 中，数字 a 和 b 的和是多少？

(A)15　(B)14　(C)10

(D)5　(E)4

13. 图示的等边三角形的边长为 $2x$ 和 $x+15$。问三角形的周长是多少？



(A)15　(B)30

(C)90　(D)45　(E)60

14. 在一次交通情况研究中调查了 50 辆行驶的汽车，发现 20%的车中不少于 1 人。在仅有 1 人的车辆中有 60%是由女性驾驶。问仅有 1 人的车辆中有多少是由男性驾驶的？

(A)10　(B)16　(C)20

(D)30　(E)40

15. 圆与正方形 $ABCD$ 内切，$BEFG$ 为边长为 1 的小正方形。问正方形 $ABCD$ 的边长是多少？

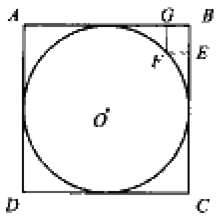
(A)$4+2\sqrt{2}$

(B)2π

(C)$5\sqrt{2}$

(D)$\frac{5}{2}\pi$

(E)$4\sqrt{2}+1$



16. 问 7 个相邻正整数的和总是下列哪一项？

(A)奇数　(B)7 的倍数

(C)偶数　(D)4 的倍数

(E)3 的倍数

(A)$8\frac{1}{3}$　(B)$8\frac{1}{2}$　(C)9

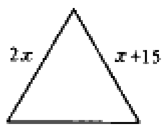
(D)$8\frac{3}{4}$　(E)$9\frac{1}{2}$

12. In the subtraction question, $\begin{array}{r}1957\\-\quad a9\\\hline 18b8\end{array}$, the sum of the digits a and b is

(A)15　(B)14　(C)10

(D)5　(E)4

13. The equilateral triangle has sides of $2x$ and $x+15$ as shown. The perimeter of the triangle is



(A)15　(B)30

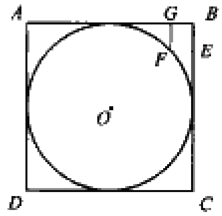
(C)90　(D)45　(E)60

14. In a traffic study, a survey of 50 moving cars is done and it is found that 20% of these contain more than one person. Of the cars containing only one person, 60% of these are driven by women. Of the cars containing just one person, how many were driven by men?

(A)10　(B)16　(C)20

(D)30　(E)40

15. A circle touches the four sides of the square $ABCD$. $BEFG$ is a square of side 1. The length of AB is



(A)$4+2\sqrt{2}$

(B)2π

(C)$5\sqrt{2}$

(D)$\frac{5}{2}\pi$

(E)$4\sqrt{2}+1$

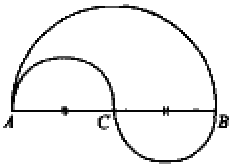
16. The sum of seven consecutive positive integers is always

(A)odd　(B)a multiple of 7

(C)even　(D)a multiple of 4

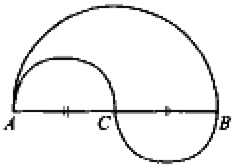
(E)a multiple of 3

17. 图中 $AC = CB = 10$ 米，AC 和 CB 是两个小的相同半圆的直径。大半圆的直径是 AB。从 A 到 B 有两个不同的路径，一个是由大半圆走，另一个是经过两个小半圆。问两个路径的差值是多少？



(A)12π　(B)6π　(C)3π
(D)2π　(E)0

17. In the diagram, $AC = CB = 10$ m, where AC and CB are each the diameter of the small equal semi-circles. The diameter of the larger semi-circle is AB. In travelling from A to B, it is possible to take one of two paths. One path goes along the semi-circular arc from A to B. A second path goes along the semi-circular arc from A to C and then along the semi-circular arc from C to B. The difference in the lengths of these two paths is



(A)12π　(B)6π　(C)3π
(D)2π　(E)0

18. 卡林写下了从 1 到 1 000 整数中各位数的和为 4 的数。如果 $\frac{a}{b}$ 是其中质数所占的比例，问 $a+b$ 等于多少？

(A)5　(B)4　(C)15
(D)26　(E)19

18. Kalyn writes down all of the integers from 1 to 1 000 that have 4 as the sum of their digits. If $\frac{a}{b}$ (in lowest terms) is the fraction of these numbers that are prime, then $a+b$ is

(A)5　(B)4　(C)15
(D)26　(E)19

19. 雷蒙德的财务代理在表中公布了服务收费项目。在她的前 25 次业务中，她每用 1 次支票就要自动计入借方 3 次，并且取现金 1 次。这以后她只选用一项业务（注：或写支票，或自动计入借方，或取现金）。问她所需的最少业务次数是多少就可超过一次性收费 15.95 美元？

<u>每项服务收费</u>

支票	0.50 美元
自动计入借方	0.60 美元
取现金	0.45 美元
一次性收费	15.95 美元

(A)29　(B)30　(C)27
(D)28　(E)31

19. Raymonde's financial institution publishes a list of service charges as shown in the table. For her first twenty five transactions, she uses Autodebit three times as often as she writes cheques. She also writes as many cheques as she makes cash withdrawals. After her twenty-fifth transaction, she begins to make single transactions. What is the smallest number of transactions she needs to make so that her monthly service charges will exceed the \$15.95 "all-in-one" fee?

<u>Service Fee per Item</u>

Cheque	\$0.50
Autodebit	\$0.60
Cash Withdrawal	\$0.45
"All-in-one" fee is	\$15.95

(A)29　(B)30　(C)27
(D)28　(E)31

20. 如图所示,4 个等腰三角形与一边长为 6 厘米的正方形相连。将 4 个三角形折上可形成一个角锥形。若角锥形的高是 4 厘米,问 4 个等腰三角形和正方形的总面积是多少?

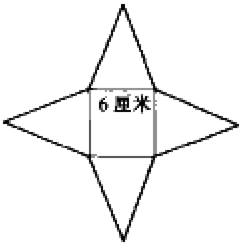
(A)84 平方厘米

(B)98 平方厘米

(C)96 平方厘米

(D)108 平方厘米

(E)90 平方厘米



20. Four identical isosceles triangles border a square of side 6 cm, as shown. When the four triangles are folded up they meet at a point to form a pyramid with a square base. If the height of this pyramid is 4 cm , the total area of the four triangles and the square is

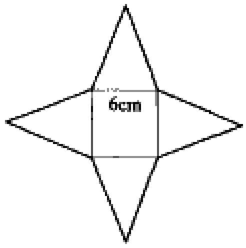
(A)84 cm^2

(B)98 cm^2

(C)96 cm^2

(D)108 cm^2

(E)90 cm^2



试卷十三

Test 13

1. 一个数放在后面的空格中，并且使 $8+\frac{7}{\square}+\frac{3}{1\,000}=8.073$。问这个数是多少？
   (A)1 000　(B)100　(C)1
   (D)10　(E)70

2. n 为一个数，并且有：
$$n\times n=n+n$$
   问有多少个不同的 n？
   (A)0　(B)1　(C)2
   (D)3　(E)无数个

3. 曲线 $y=4(x-2)(x+3)$ 与 x 轴相交于 P 点和 Q 点。问线段 PQ 的长度是多少？
   (A)4　(B)20　(C)$\frac{5}{4}$
   (D)5　(E)1

4. 在一周中，一种股票的涨落如下：

星期一	−150	星期二	+106
星期三	−47	星期四	+182
星期五	−210		

   问这周股票的净变化是多少？
   (A)落 119　(B)涨 119
   (C)涨 91　(D)落 91
   (E)涨 695

5. 若 $x\times y=x+y^2$，那么 2×3 等于多少？
   (A)8　(B)25　(C)11
   (D)13　(E)7

1. A number is placed in the box to make the following statement true: $8+\frac{7}{\square}+\frac{3}{1\,000}=8.073$. What is this number?
   (A)1 000　(B)100　(C)1
   (D)10　(E)70

2. n is a number such that
$$n\times n=n+n.$$
   How many such numbers are there?
   (A)0　(B)1　(C)2
   (D)3　(E)infinitely many

3. The graph of $y=4(x-2)(x+3)$ cuts the x-axis at two points P and Q. The length of the line segment PQ is
   (A)4　(B)20　(C)$\frac{5}{4}$
   (D)5　(E)1

4. During the week, a Stock Exchange made the following gains and losses:

Monday	−150	Tuesday	+106
Wednesday	−47	Thursday	+182
Friday	−210		

   What was the net change for the week?
   (A)a loss of 119　(B)a gain of 119
   (C)a gain of 91　(D)a loss of 91
   (E)a gain of 695

5. If $x\times y=x+y^2$, then 2×3 equals
   (A)8　(B)25　(C)11
   (D)13　(E)7

6. 下列 5 个等式有多少是对的?

(Ⅰ)40 的 20% = 8　(Ⅱ)$2^3=8$　(Ⅲ)$7-3\times2=8$

(Ⅳ)$3^2-1^2=8$　(Ⅴ)$2\times(6-4)^2=8$

(A)1　(B)2　(C)3

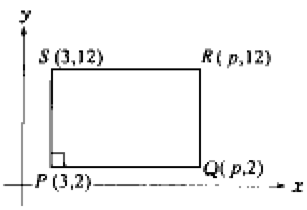
(D)4　(E)5

7. 介于 10 至 20 之间的质数和为 Q。问 Q 的最大质数除数是多少?

(A)2　(B)3　(C)5

(D)7　(E)11

8. 图中给出了长方形 $PQRS$ 四个点的坐标。长方形 $PQRS$ 的面积是 120。问坐标中的 p 值是多少?



(A)10　(B)12

(C)13　(D)14　(E)15

9. 一组 5 个不同的正整数的平均值为 11。这组数中可能的最大数是多少?

(A)45　(B)40　(C)35

(D)44　(E)46

10. 若汤姆步行去学校,骑自行车返回,这一趟需要 90 分钟。若他来回都骑自行车则仅需 30 分钟。问他来回都步行则需要几个小时(假定步行或骑自行车均为恒速)?

(A)2　(B)2.5　(C)3

(D)3.5　(E)4

11. 地球的十分之三为陆地,其余的则由水覆盖。97%的水为咸水,其余的则为淡水。问地球有百分之几的面积为淡水覆盖?

6. Of the following five statements, how many are correct?

(Ⅰ)20% of 40 = 8　(Ⅱ)$2^3=8$　(Ⅲ)$7-3\times2=8$

(Ⅳ)$3^2-1^2=8$　(Ⅴ)$2(6-4)^2=8$

(A)1　(B)2　(C)3

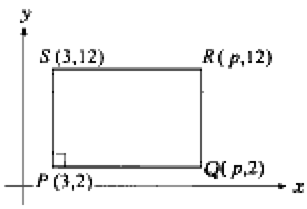
(D)4　(E)5

7. The prime numbers between 10 and 20 are added together to form the number Q. What is the largest prime divisor of Q?

(A)2　(B)3　(C)5

(D)7　(E)11

8. The coordinates of the vertices of rectangle $PQRS$ are given in the diagram. The area of rectangle $PQRS$ is 120. The value of p is



(A)10　(B)12　(C)13

(D)14　(E)15

9. A set of five different positive integers has an average (arithmetic mean) of 11. What is the largest possible number in this set?

(A)45　(B)40　(C)35

(D)44　(E)46

10. If Tom walks to school and rides his bicycle back home, it takes him 90 minutes. If he rides his bicycle both ways, it takes him 30 minutes. How many hours would it take him to make the trip to school and back by walking? (Assume that he walks at a constant speed and that he cycles at a constant speed.)

(A)2　(B)2.5　(C)3

(D)3.5　(E)4

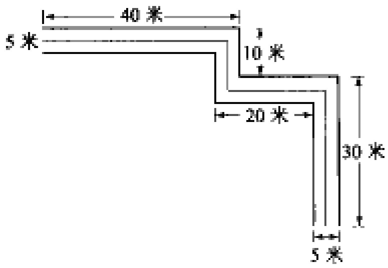
11. Three tenths of our planet Earth is covered with land and the rest is covered with water. Ninety-seven percent of the water is salt water and the rest is fresh water. What percentage of the Earth

(A)20.1%　(B)79.7%　(C)32.1%
(D)2.1%　(E)9.6%

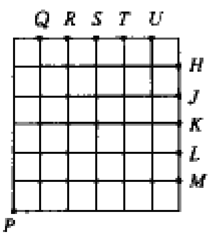
12. 在某一个月中，有 3 个星期天的日期是偶数。问这个月的第十天是星期几？
(A)星期六　(B)星期天　(C)星期一
(D)星期二　(E)星期三

13. 吉姆向南行驶 60 千米，向西行驶 40 千米，向北行驶 20 千米，再向东行驶 10 千米。问从起点到终点的直线距离是多少？
(A)30 千米　(B)50 千米　(C)40 千米
(D)70 千米　(E)35 千米

14. 一铺面的人行道 5 米宽，人行道中间有一黄线。如图所示，若道路边缘的长度分别为 40 米，10 米，20 米和 30 米，问黄线有多长？
(A)100 米　(B)97.5 米　(C)95 米
(D)92.5 米　(E)90 米



15. 在 6×6 的网格中，从 P 点引出两条线将网格分成3个面积相等的区域。问这两条线分别通过哪两个点？
(A)M 和 Q
(B)L 和 R
(C)K 和 S
(D)H 和 U
(E)J 和 T

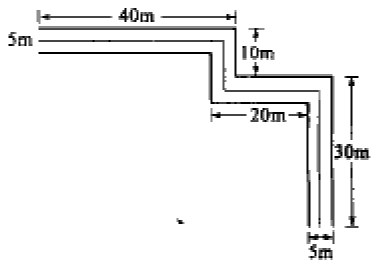


is covered in fresh water?
(A)20.1%　(B)79.7%　(C)32.1%
(D)2.1%　(E)9.6%

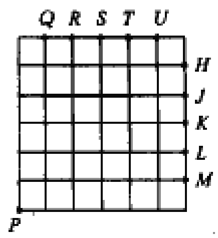
12. In a certain month, three of the Sundays have dates that are even numbers. The tenth day of this month is a
(A)Saturday　(B)Sunday　(C)Monday
(D)Tuesday　(E)Wednesday

13. Jim drives 60 km south, 40 km west, 20 km north, and 10 km east. What is the distance from his starting point to his finishing point?
(A)30 km　(B)50 km　(C)40 km
(D)70 km　(E)35 km

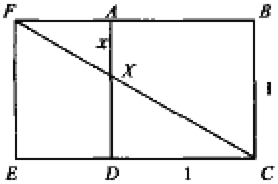
14. A paved pedestrian path is 5 metres wiee. A yellow line is painted down the middle. If the edges of the path measure 40 m, 10 m, 20 m, and 30 m, as shown, what is the length of the yellow line?
(A)100 m　(B)97.5 m　(C)95 m
(D)92.5 m　(E)90 m



15. In the 6 by 6 grid shown, two lines are drawn through point P, dividing the grid into three regions of equal area . These lines will pass through the points
(A)M and Q
(B)L and R
(C)K and S
(D)H and U
(E)J and T



16. $FBCE$ 为一长方形，$ABCD$ 为一边长为 1 的正方形。若 $AX=x$，问 AF 等于多少？



(A)$2(1-x)$　　(B)$\frac{x}{1-x}$　　(C)$\frac{1}{4x^2}$

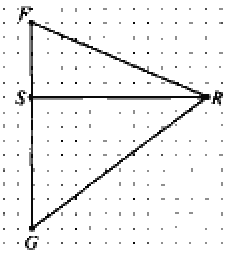
(D)$\frac{2x^2}{1-x}$　　(E)$2x$

17. 佛雷德(F)、桑迪(S)、罗伯特(R)和盖伊(G)的家都标在长方形点阵图上，并且用线段相连，佛雷德考虑 4 条路线去访问每一位朋友：

(Ⅰ)$F\to R\to S\to G$　(Ⅱ)$F\to S\to G\to R$

(Ⅲ)$F\to R\to G\to S$　(Ⅳ)$F\to S\to R\to G$

如果 $FS=5$ 千米，$SG=9$ 千米，$SR=12$ 千米，问最长的行走路线与最短的行走路线之差是多少千米？

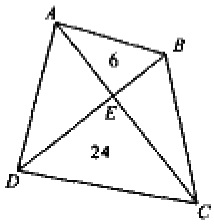


(A)8　　(B)13

(C)15　　(D)2

(E)0

18. 四边形 $ABCD$ 的对角线相交于 E 点。$\triangle AEB$ 的面积为 6，$\triangle DEC$ 的面积为 24，$\triangle AED$ 的面积与 $\triangle BEC$ 的面积相等。问 $\triangle AED$ 的面积是多少？

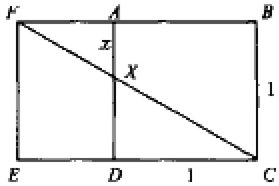


(A)12　　(B)15　　(C)18

(D)20　　(E)30

19. 在等边三角形 ABC 中，由 P 点与三个顶点 A、B、C 连接并形成三个全等三角形。D、E、F 分别是$\triangle ABC$ 三边上的中点，相连后又形成一三

16. $FBCE$ is a rectangle and $ABCD$ is a square of side 1. If AX has length x then the value of AF is



(A)$2(1-x)$　　(B)$\frac{x}{1-x}$　　(C)$\frac{1}{4x^2}$

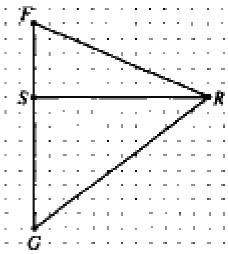
(D)$\frac{2x^2}{1-x}$　　(E)$2x$

17. The homes of Fred (F), Sandy (S), Robert (R), and Guy (G) are marked on the rectangular grid with straight lines joining them. Fred is considering four routes to visit each of his friends:

(Ⅰ)$F\to R\to S\to G$　(Ⅱ)$F\to S\to G\to R$

(Ⅲ)$F\to R\to G\to S$　(Ⅳ)$F\to S\to R\to G$

If $FS=5$ km, $SG=9$ km and $SR=12$ km, the difference between the longest and the shortest trip, in km, is

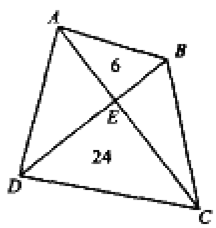


(A)8　　(B)13

(C)15　　(D)2

(E)0

18. The diagonals of the quadrilateral $ABCD$ intersect at the point E. The area of triangle AEB is 6, that of triangle DEC is 24, and the areas of triangles AED and BEC are equal. The area of triangle AED is



(A)12　　(B)15　　(C)18

(D)20　　(E)30

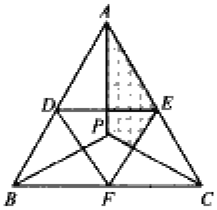
19. In equilateral triangle ABC, line segments are drawn from a point P to the vertices A, B and C to form three identical triangles. The points D, E and F are

角形。问图中阴影部分的面积是△*ABC*的几分之几?

(A)$\frac{1}{5}$　(B)$\frac{5}{24}$

(C)$\frac{1}{4}$　(D)$\frac{2}{9}$

(E)$\frac{2}{7}$

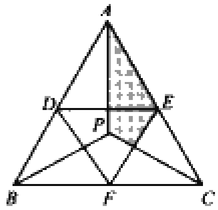


the midpoints of the three sides and they are joined as shown in the diagram. What fraction of △ *ABC* is shaded?

(A)$\frac{1}{5}$　(B)$\frac{5}{24}$

(C)$\frac{1}{4}$　(D)$\frac{2}{9}$

(E)$\frac{2}{7}$



20. 罐子中的糕点上有1 000个巧克力片。除了一个糕点之外,其他所有糕点上的巧克力片数都相同。这个特殊糕点上的巧克力片比其他糕点多一块。罐子中的糕点在一打至三打之间(注:12至36个之间)。问罐子中糕点的个数与这个特殊糕点上巧克力片的个数的和是多少?

(A)65　(B)64　(C)63

(D)66　(E)67

20. The cookies in a jar contain a total of 1 000 chocolate chips. All but one of these cookies contains the same number of chips; it contains one more chip than the others. The number of cookies in the jar is between one dozen and three dozen. What is the sum of the number of cookies in the jar and the number of chips in the cookie with the extra chocolate chip?

(A)65　(B)64　(C)63

(D)66　(E)67

试卷十四

Test 14

1. 若$\sqrt{x+1}=3$,问$(x+2)^2$等于多少?

(A)25 (B)36 (C)64
(D)81 (E)100

2. 在连续45天中最多可以有几个星期一?

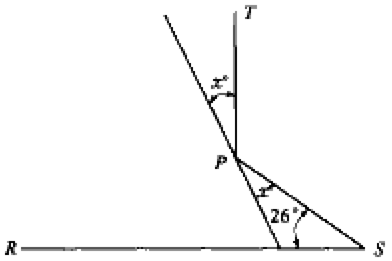
(A)5 (B)6 (C)7
(D)8 (E)9

3. 当唐纳德打保龄球时,球的速度达到每小时144千米,若球滚动的距离为20米,问需要滚动几秒钟?

(A)$\frac{1}{4}$ (B)$\frac{1}{3}$ (C)$\frac{1}{2}$
(D)$\frac{2}{5}$ (E)$\frac{2}{3}$

4. 一束光从S点射出,到达P点后沿PT折射到T点,并且$PT\perp RS$,问x是多少度?

(A)26° (B)32° (C)37°
(D)38° (E)45°



5. 罗威娜可在18分钟内割去$\frac{2}{5}$草坪的草。若她从上午10点开始工作,并且以这一速度割草,问她

1. If $\sqrt{x+1}=3$, then $(x+2)^2$ equals

(A)25 (B)36 (C)64
(D)81 (E)100

2. The greatest number of Mondays which can occur in 45 consecutive days is

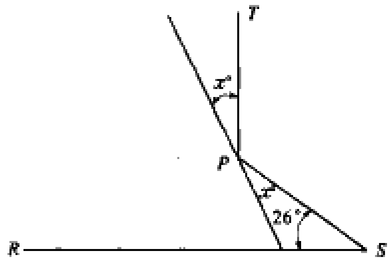
(A)5 (B)6 (C)7
(D)8 (E)9

3. When Donald bowls, the ball travels at 144 kilometres per hour. If the distance the ball travels is 20 metres then the time, in seconds, that the ball travels is

(A)$\frac{1}{4}$ (B)$\frac{1}{3}$ (C)$\frac{1}{2}$
(D)$\frac{2}{5}$ (E)$\frac{2}{3}$

4. A beam of light shines from a point S, reflects off a reflector at point P, and reaches a point T so that PT is perpendicular to RS. Then x is

(A)26° (B)32° (C)37°
(D)38° (E)45°



5. Rowena is able to mow $\frac{2}{5}$ of a lawn in 18 minutes. If she began the job at 10:00 a.m., and

在什么时间割完整个草坪的草？

(A)10:8　(B)11:30

(C)10:40　(D)10:25

(E)10:45

6. 一个班级 25 个同学中，每个同学最多有一个宠物，五分之三的同学有猫，20%的同学有狗，3 个同学有象，另外还有一些同学没有宠物。问有多少同学没有宠物？

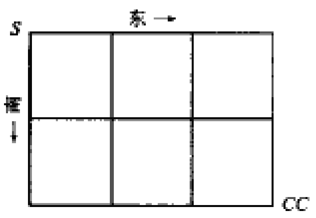
(A)5　(B)4　(C)3

(D)2　(E)1

7. 游行队伍从学校（S点）出发，通过城区到达社区中心（CC 点）。游行队伍只能是向东或向南前进，问从 S 点到 CC 点有多少条不同的最短路径？

(A)6　(B)10　(C)4

(D)8　(E)9



8. 劳拉每小时挣 10 美元，并且工作 10 天，每天 8 小时，她花了收入的 25%用于支付食品和衣服，又缴了 350 美元房租。问她还剩留有多少钱？

(A)275 美元　(B)200 美元　(C)350 美元

(D)250 美元　(E)300 美元

9. △ABC 的三条边都分成三等份。问连接形成的六边形 UVWXYZ 的面积是△ABC 的面积的几分之几？

(A)$\frac{5}{9}$　(B)$\frac{2}{3}$　(C)$\frac{1}{2}$

(D)$\frac{3}{4}$　(E)$\frac{5}{8}$

mowed at this same constant rate, when did she finish mowing the entire lawn?

(A)10:08 a.m.　(B)11:30 a.m.

(C)10:40 a.m.　(D)10:25 a.m.

(E)10:45 a.m.

6. In a class of 25 students, each student has at most one pet. Three-fifths of the students have cats, 20% have dogs, three have elephants, and the other students have no pets. How many students have no pets?

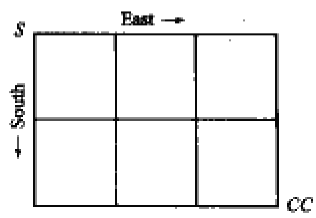
(A)5　(B)4　(C)3

(D)2　(E)1

7. A march goes through the streets of a town from the shool (*S*) to the community centre (*CC*). If the march can only travel East or South, then the number of different shortest routes is

(A)6　(B)10　(C)4

(D)8　(E)9



8. Laura earns \$10/hour and works 8 hours per day for 10 days. She first spends 25% of her pay on food and clothing, and then pays \$350 in rent. How much of her pay does she have left?

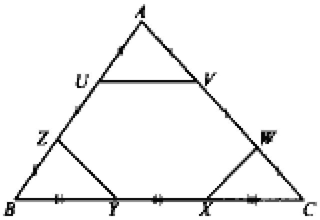
(A) \$275　(B) \$200　(C) \$350

(D) \$250　(E) \$300

9. Each side of triangle *ABC* is divided into 3 equal parts. The ratio of the area of the hexagon *UVWXYZ* to the area of triangle *ABC* is

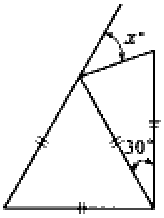
(A)$\frac{5}{9}$　(B)$\frac{2}{3}$　(C)$\frac{1}{2}$

(D)$\frac{3}{4}$　(E)$\frac{5}{8}$



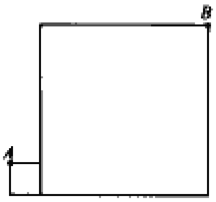
10. 一立方体的表面积为 24 平方厘米。问立方体的体积是多少?
(A)4 立方厘米 (B)24 立方厘米
(C)8 立方厘米 (D)27 立方厘米
(E)64 立方厘米

11. 计算图中所示的 x 的值。
(A)30° (B)40°
(C)60° (D)50°
(E)45°

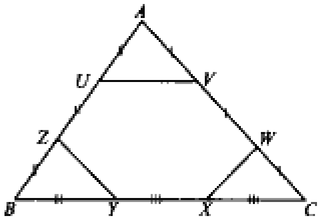


12. 丹尼尔的岁数是他父亲岁数的九分之一。一年后,丹尼尔父亲的岁数将是丹尼尔的七倍。问现在他们两人的岁数差是多少?
(A)24 (B)25 (C)26
(D)27 (E)28

13. 如图所示有两个正方形。小正方形的边长为 1,大正方形的边长为 7。问 AB 有多长?
(A)14 (B)$\sqrt{113}$
(C)10 (D)$\sqrt{85}$
(E)$\sqrt{72}$

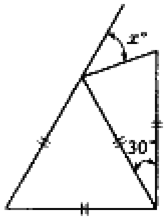


14. 如图所示有 3 个半圆,两两相切,并且半径都在 AC 边上。$DB\perp AC$,DA 与小圆相交于 P 点,DC 与中圆相交于 Q 点。若 $DB=10$,问 PQ 等于多少?
(A)$3\sqrt{10}$ (B)$6\sqrt{3}$ (C)$4\sqrt{6}$
(D)$7\sqrt{2}$ (E)上述答案都不对



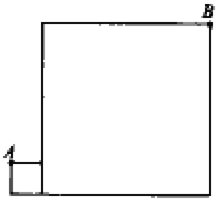
10. The surface area of a cube is 24 cm^2. The volume of this cube is
(A)4 cm^3 (B)24 cm^3
(C)8 cm^3 (D)27 cm^3
(E)64 cm^3

11. In the diagram, the value of x is
(A)30° (B)40°
(C)60° (D)50°
(E)45°

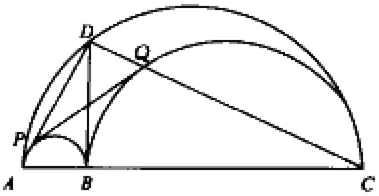


12. Daniel's age is one-ninth of his father's age. One year from now, Daniel's father's age will be seven times Daniel's age. The difference between their age is
(A)24 (B)25 (C)26
(D)27 (E)28

13. Two squares are positioned, as shown. The smaller square has side length 1 and the larger square has side length 7. The length of AB is
(A)14 (B)$\sqrt{113}$
(C)10 (D)$\sqrt{85}$
(E)$\sqrt{72}$



14. The diagram shows three semicircles which are mutually tangent and have their diameters on the line AC. The line DB is perpendicular to AC with DA and DC intersecting the two smaller circles at P and Q respectively. If $DB=10$, then the length of PQ is
(A)$3\sqrt{10}$ (B)$6\sqrt{3}$ (C)$4\sqrt{6}$
(D)$7\sqrt{2}$ (E)None of these



15. 方格中的数是多少才能使 $10^4\times100^{\square}=1000^6$?

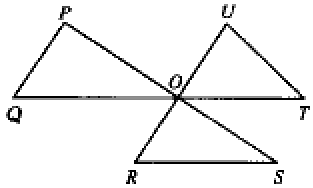
(A)7　　(B)5　　(C)2

(D)$\frac{3}{2}$　　(E)10

16. 如图所示,线段 PS,QT 和 RU 在 O 点相交。将 P 与 Q 相连,R 与 S 相连,T 与 U 相连,以形成三个三角形。问 $\angle P+\angle Q+\angle R+\angle S+\angle T+\angle U$ 等于多少度?

(A)450°　　(B)270°　　(C)360°

(D)540°　　(E)720°



17. 64 个白色的 $1\times1\times1$ 的方块用于形成 1 个 $4\times4\times4$ 的立方体,这一立方体的 6 个面都涂上红色。立方体再拆开成 64 个方块。方块按下列方法计分:

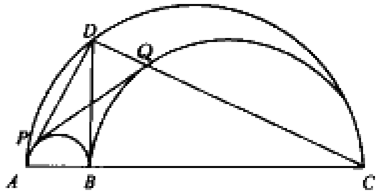
方块被涂上红色的面	计分
3	3
2	2
1	1
0	−7

问 $4\times4\times4$ 立方体的总积分是多少?

(A)40　　(B)41　　(C)42

(D)43　　(E)44

18. 整数 2,2,5,5,8 和 9 被写在如图所示的 6 张牌上,可在 6 张牌中任选几张牌,并确定牌上数的和。注意用这种方法不能得到数值 1 和 30。问



15. What number should be placed in the box to make $10^4\times100^{\square}=1000^6$?

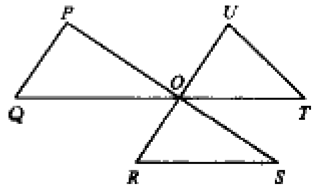
(A)7　　(B)5　　(C)2

(D)$\frac{3}{2}$　　(E)10

16. Lines PS, QT and RU intersect at a common point O, as shown. P is joined to Q, R to S, and T to U, to form triangles. The value of $\angle P+\angle Q+\angle R+\angle S+\angle T+\angle U$ is

(A)450°　　(B)270°　　(C)360°

(D)540°　　(E)720°



17. Sixty-four white $1\times1\times1$ cubes are used to form a $4\times4\times4$ cube, which is then painted red on each of its six faces. This large cube is then broken up into its 64 unit cubes. Each unit cube is given a score as follows:

Exact number of faces painted red	Score
3	3
2	2
1	1
0	−7

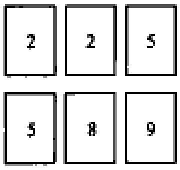
The total score for the $4\times4\times4$ cube is

(A)40　　(B)41　　(C)42

(D)43　　(E)44

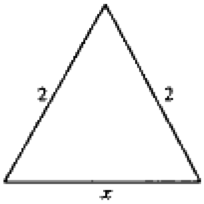
18. The integers 2,2,5,5,8 and 9 are written on six cards, as shown. Any number of the six cards is chosen, and the sum of the integers on these cards

通过这种方法从 1 至 31 之间有几个整数不能得到?



(A)4　　(B)22
(C)8　　(D)10
(E)6

19. 等腰三角形三边的边长分别为 2,2,x。问 x 等于多少时三角形的面积最大?

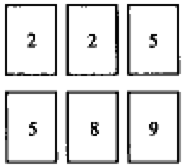


(A)1　　(B)$\sqrt{2}$
(C)2　　(D)$2\sqrt{2}$
(E)3

20. 托尼和玛利亚进行赛跑训练,即在 700 米长的滑雪坡上跑上、跑下。他们俩的上坡速度不同,下坡速度则是两人各自上坡速度的一倍。玛利亚首先到达坡顶,立即回返下坡,并且在离坡顶 70 米处与托尼相遇。当玛利亚到达坡底(注:起点)后,问托尼落后有多远?

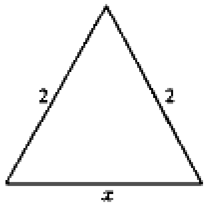
(A)140 米　　(B)250 米　　(C)280 米
(D)300 米　　(E)320 米

is determined. Note that the integers 1 and 30 cannot be obtained as sums in this way. How many of the integers from 1 to 31 cannot be obtained as sums?



(A)4　　(B)22
(C)8　　(D)10
(E)6

19. An isosceles triangle has sides of length 2,2 and x. For which value of x is the area of the triangle a maximum?



(A)1　　(B)$\sqrt{2}$
(C)2　　(D)$2\sqrt{2}$
(E)3

20. Tony and Maria are training for a race by running all the way up and down a 700 m long ski slope. They each run up the slope at different constant speeds. Coming down the slope, each runs at double his or her uphill speed. Maria reaches the top first, and immediately starts running back down, meeting Tony 70 m from the top. When Maria reaches the bottom, how far behind is Tony?

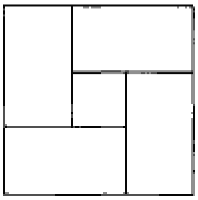
(A)140 m　　(B)250 m　　(C)280 m
(D)300 m　　(E)320 m

试卷十五

Test 15

1. 下列哪一个表达式等于奇数?
(A)$3\times5+1$ (B)$2\times(3+5)$ (C)$3\times(3+5)$
(D)$3+5+1$ (E)$\frac{3+5}{2}$

2. 如图所示有4块长方形砖包围有一个正方形。长方形砖的长度为18,宽度为10。问围成的小正方形的边长是多少?



(A)6 (B)8
(C)9 (D)10
(E)12

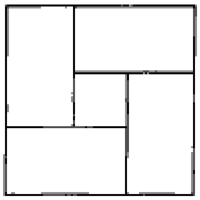
3. 一长方形盒子的体积是144立方厘米,若盒子的长为12厘米,宽为6厘米,问盒子的高是多少?
(A)126厘米 (B)72厘米 (C)4厘米
(D)8厘米 (E)2厘米

4. 一个罐子中燕麦糕点的数目与巧克力糕点的数目比为5:2。若有20块燕麦糕点,问罐子中有多少块巧克力糕点?
(A)28 (B)50 (C)8
(D)12 (E)18

5. 条形图表中显示有柯瓦芭诺女士班上男学生和女学生的人数。问女学生是全班学生的百分之几?
(A)40% (B)15% (C)25%
(D)10% (E)60%

1. Which of the following expressions is equal to an odd integer?
(A)$3\times5+1$ (B)$2\times(3+5)$ (C)$3\times(3+5)$
(D)$3+5+1$ (E)$\frac{3+5}{2}$

2. The diagram shows 4 bricks enclosing a square. Each brick has length 18 and breadth 10. The length of the side of the enclosed square is

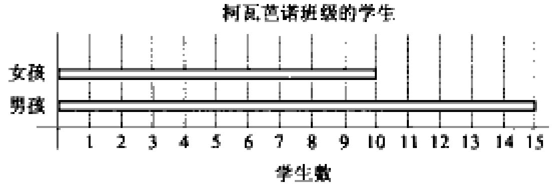


(A)6 (B)8
(C)9 (D)10
(E)12

3. The volume of a rectangular box is 144 cm^3. If its length is 12 cm and its width is 6 cm, what is its height?
(A)126 cm (B)72 cm (C)4 cm
(D)8 cm (E)2 cm

4. In a jar, the ratio of the number of oatmeal cookies to the number of chocolate chip cookies is 5:2. If there are 20 oatmeal cookies, the number of chocolate chip cookies in the jar is
(A)28 (B)50 (C)8
(D)12 (E)18

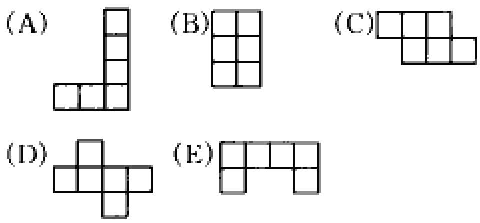
5. The bar graph below shows the numbers of boys and girls in Mrs. Kuwabara's class. The percentage of students in the class who are girls is
(A)40% (B)15% (C)25%
(D)10% (E)60%



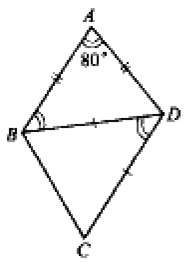
6. 下列哪一个论述不对？
   (A)四边形有四个边。
   (B)三角形的内角和是 180°。
   (C)长方形有 4 个 90°角。
   (D)三角形可有 2 个角等于 90°。
   (E)长方形是四边形。

7. 若 $a+b=3, b+c=4, c+a=5$，问 $a+b+c$ 等于多少？
   (A)6　(B)7　(C)8
   (D)9　(E)12

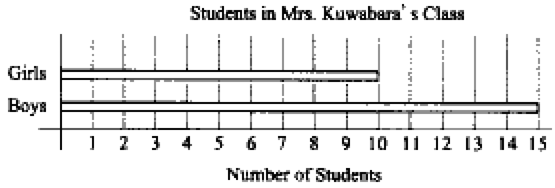
8. 下列哪一个图可以沿边线折成一个正方形？



9. 图中 $\angle ABD=\angle BDC$，$\angle DAB=80°$，并且 $AB=AD$，$DB=DC$。问 $\angle BCD$ 是多少度？
   (A)65°　(B)50°
   (C)80°　(D)60°
   (E)70°



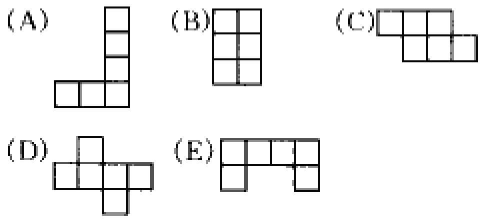
10. $2^x+3^y=41$，且 x 和 y 均为自然数，问 $x+y$ 等于多少？
   (A)9　(B)8　(C)7
   (D)6　(E)5



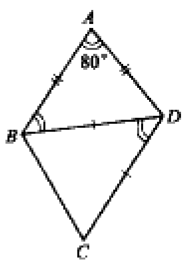
6. Which of the following statements is not true?
   (A) A quadrilateral has four sides.
   (B) The sum of the angles in a triangle is 180°.
   (C) A rectangle has four 90° angles.
   (D) A triangle can have two 90° angles.
   (E) A rectangle is a quadrilateral.

7. If $a+b=3, b+c=4$ and $c+a=5$, then $a+b+c$ equals
   (A)6　(B)7　(C)8
   (D)9　(E)12

8. Which of the following can be folded along the lines to form a cube?



9. In the diagram, $\angle ABD=\angle BDC$ and $\angle DAB=80°$. Also, $AB=AD$ and $DB=DC$. The measure of $\angle BCD$ is
   (A)65°　(B)50°
   (C)80°　(D)60°
   (E)70°



10. If $2^x+3^y=41$, where x and y are natural numbers, then the value of $x+y$ is
   (A)9　(B)8　(C)7
   (D)6　(E)5

11. 抛掷三枚一分钱硬币。问三枚都是头向上的概率是多少？

(A)$\frac{1}{8}$ (B)$\frac{1}{6}$ (C)$\frac{1}{4}$

(D)$\frac{1}{3}$ (E)$\frac{1}{2}$

12. 若 P 是一个负整数，问下列哪一个数总是正的？

(A)P^2 (B)$\frac{1}{P}$ (C)$2P$

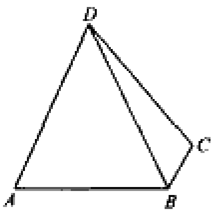
(D)$P-1$ (E)P^3

13. 数 $1\,000^{10}$ 展开后有多少个零？

(A)13 (B)30 (C)4

(D)10 (E)1 000

14. 四面体 $ABCD$ 的 6 个棱的长度分别为 7，13，18，27，36 和 41。若棱 AB 的长度为 41，问棱 CD 的长度是多少？



(A)7 (B)13

(C)18 (D)27

(E)36

15. 数 7^{62} 的个位数是多少？

(A)7 (B)1 (C)3

(D)9 (E)5

16. 一矩形的边长为整数(按厘米计)，面积为 36 平方厘米。问矩形可能的最长周长是多少？

(A)72 厘米 (B)80 厘米

(C)26 厘米 (D)74 厘米

(E)48 厘米

17. 若正方形的对角线长为 2，问正方形的面积是多少？

(A)1 (B)2 (C)3

(D)4 (E)5

18. 一地图的比例为 1∶10 000，在地图上一森林为

11. Three pennies are flipped. What is the probability that they all land with heads up?

(A)$\frac{1}{8}$ (B)$\frac{1}{6}$ (C)$\frac{1}{4}$

(D)$\frac{1}{3}$ (E)$\frac{1}{2}$

12. If P is a negative integer, which of the following is always positive?

(A)P^2 (B)$\frac{1}{P}$ (C)$2P$

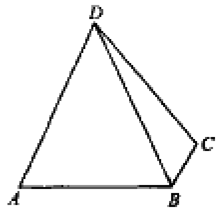
(D)$P-1$ (E)P^3

13. When expanded, the number of zeros in $1\,000^{10}$ is

(A)13 (B)30 (C)4

(D)10 (E)1 000

14. The six edges of tetrahedron $ABCD$ measure 7, 13, 18, 27, 36 and 41 units. If the length of edge AB is 41 what is the length of edge CD?



(A)7 (B)13

(C)18 (D)27

(E)36

15. The units digit (that is, the last digit) of 7^{62} is

(A)7 (B)1 (C)3

(D)9 (E)5

16. A rectangle has sides of integer length (when measured in cm) and an area of 36 cm^2. What is the maximum possible perimeter of the rectangle?

(A)72 cm (B)80 cm

(C)26 cm (D)74 cm

(E)48 cm

17. If each diagonal of a square has length 2, then the area of the square is

(A)1 (B)2 (C)3

(D)4 (E)5

18. A map is drawn to a scale of 1∶10 000. On the

10 厘米×10 厘米的矩形区域。问森林的实际面积是多少平方千米？

(A)100　(B)1 000 000　(C)1 000
(D)1　(E)10

19. 维罗妮卡的成绩单上有 6 次考试的成绩。6 次考试的平均成绩为 74；6 次考试成绩的最频值为 76；6 次考试成绩的中值为 76；最低成绩为 50；最高成绩为 94。只有一个成绩出现过两次，并且没有任何成绩的出现多于两次。假定她的成绩都是整数，问 6 次考试中第 2 低的成绩有多少可能的值？

(A)17　(B)16　(C)25
(D)18　(E)24

20. 艾米丽用一排地砖创造了一种跳跃游戏。她将地砖标上 1,2,3,4,…并从第 2 块地砖开始沿这一排地砖跳跃，每两块地砖着地一次，最后停在倒数第 2 块地砖上。转身后从倒数第 2 块地砖她开始向回跳跃，这一次是每隔三块地砖着地一次，最后停在第 1 块地砖上。最后她又转身从第 1 块地砖开始跳跃，每隔五块地砖着地一次。这一次她又停在倒数第 2 块地砖上。问这一排一共有多少地砖？

(A)39　(B)40　(C)47
(D)49　(E)53

map, a Forest occupies a rectangular region measuring 10 cm by 10 cm. What is the actual area of the Forest ,in km^2?

(A)100　(B)1 000 000　(C)1 000
(D)1　(E)10

19. Veronica has 6 marks on her report card.
The mean of the 6 marks is 74.
The mode of the 6 marks is 76.
The median of the 6 marks is 76.
The lowest mark is 50.
The highest mark is 94.
Only one mark appears twice and no mark appears more than twice.
Assuming all of her marks are integers, the number of possibilities for her second lowest mark is

(A)17　(B)16　(C)25
(D)18　(E)24

20. Emily has created a jumping game using a straight row of floor tiles that she has numbered 1,2,3,4,⋯ Starting on tile 2, she jumps along the row, landing on every second tile, and stops on the second last tile in the row. Starting from this tile, she turns and jumps back toward the start, this time landing on every third tile. She stops on tile 1. Finally, she turns again and jumps along the row, landing on every fifth tile. This time, she again stops on the second last tile. The number of tiles in the row could be

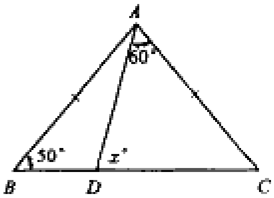
(A)39　(B)40　(C)47
(D)49　(E)53

试卷十六

Test 16

1. 图示的△ABC 是一等腰三角形，即 $AB = AC$。若∠$ABC = 50°$，∠$DAC = 60°$，问 x 是多少度？

(A)70°　(B)50°　(C)80°
(D)60°　(E)30°



2. 哪一个数加倍后再加上 13 等于 89？

(A)51　(B)43　(C)28
(D)38　(E)76

3. 下表列有某一城市上一周最高和最低温度的记录。问哪一天的温差最大？

天	最高温度(℃)	最低温度(℃)
星期一	5	−3
星期二	0	−10
星期三	−2	−11
星期四	−8	−13
星期五	−7	−9

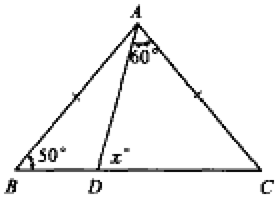
(A)星期一　(B)星期二　(C)星期三
(D)星期四　(E)星期五

4. 将$\sqrt{5}$，2.1，$\frac{7}{3}$，2.05，$2\frac{1}{5}$从小到大排列，问中间的数字是哪一个？

(A)$\sqrt{5}$　(B)2.1　(C)$\frac{7}{3}$

1. In the diagram, triangle ABC is isosceles, with $AB = AC$. If $\angle ABC = 50°$ and $\angle DAC = 60°$, the value of x is

(A)70°　(B)50°　(C)80°
(D)60°　(E)30°



2. What number, when doubled and then increased by 13, equals 89?

(A)51　(B)43　(C)28
(D)38　(E)76

3. The table to the right shows the high and low temperatures recorded in a city last week. On what day was the temperature range the greatest?

Day	High Temperature (℃)	Low Temperature (℃)
Monday	5	−3
Tuesday	0	−10
Wednesday	−2	−11
Thursday	−8	−13
Friday	−7	−9

(A)Monday　(B)Tuesday　(C)Wednesday
(D)Thursday　(E)Friday

4. When the numbers $\sqrt{5}$, 2.1, $\frac{7}{3}$, 2.05, $2\frac{1}{5}$ are arranged in order from smallest to largest, the middle number is

(A)$\sqrt{5}$　(B)2.1　(C)$\frac{7}{3}$

(D)2.05　　(E)$2\frac{1}{5}$

5. 在麦克罗伯特先生 8 年级的班上有 30 个学生，其中有三分之一的学生为女生，有四分之三的男生打篮球。问班上有多少男生打篮球？

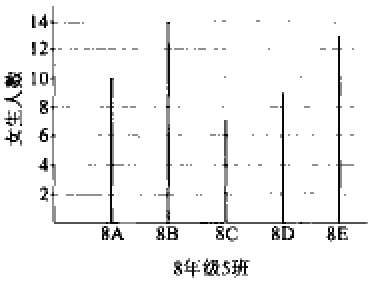
(A)3　　(B)22　　(C)10
(D)20　　(E)15

6. 将不同的两个数字填入空格使 15.2 + 1.52 + 0.15□ + □.128 = 20 成立，问这两个数的和是多少？

(A)5　　(B)6　　(C)7
(D)8　　(E)9

7. 图表中显示的是 8 年级 5 个班的女学生人数，各班用 8A 至 8E 表示，问这 5 个班女学生的平均人数是多少？

(A)10.0　　(B)10.7　　(C)10.4
(D)10.3　　(E)10.6



8. 三角形三个角的度数之比为 2:3:4。问该三角形最大角的度数是多少？

(A)100°　　(B)60°　　(C)80°
(D)90°　　(E)160°

9. 乔治记录有 7 次考试，考试均为百分计。考试成绩没有相同的。他用这 7 次成绩进行统计分析。不小心将最高分写成更高一些。问由于这一错误改变了下列中几个参数？

(D)2.05　　(E)$2\frac{1}{5}$

5. There are 30 students in Mr. McRoberts' Grade 8 class. One-third of the students are girls. Three-quarters of the boys play basketball. The number of boys in the class who play basketball is

(A)3　　(B)22　　(C)10
(D)20　　(E)15

6. A different digit is inserted into each of the two boxes to make the equation

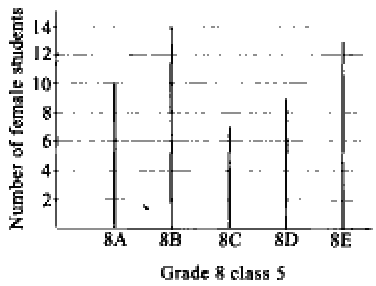
15.2 + 1.52 + 0.15□ + □.128 = 20

true. The sum of the digits in the two boxes is

(A)5　　(B)6　　(C)7
(D)8　　(E)9

7. The graph shows the number of female students in five Grade 8 classes labelled 8A through 8E. The average (mean) number of female students in these five classes is

(A)10.0　　(B)10.7　　(C)10.4
(D)10.3　　(E)10.6



8. The angles of a triangle are in the ratio 2:3:4. The largest angle in the triangle is

(A)100°　　(B)60°　　(C)80°
(D)90°　　(E)160°

9. George wrote seven tests and each was marked out of 100. No two of his marks were the same. He recorded the seven marks to do a statistical analysis. He accidentally recorded his highest mark *higher* than it actually was. How many of the

●平均数
●中位值
●最低值
●取值范围

(A)0 (B)1 (C)2
(D)3 (E)4

10. 一矩形沙坑长 10 米,深 50 厘米,宽 2 米。若沙坑的一半已被填满,问还需要多少立方米的沙才能将沙坑填满?

(A)6 (B)5 (C)20
(D)7.5 (E)10

11. 计算 $\dfrac{1}{1+\dfrac{1}{1+\dfrac{1}{2}}}$ 的值。

(A)$\frac{3}{5}$ (B)$\frac{5}{3}$ (C)$\frac{1}{3}$
(D)3 (E)$\frac{3}{2}$

12. $\triangle ABC$ 三个顶角的坐标是 $A(1,0)$,$B(21,0)$ 和 $C(21,21)$。问三角形的周长是多少?

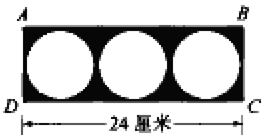
(A)70 (B)42 (C)64
(D)72 (E)63

13. 集合 $\{-5,-4,-3,-2,-1,0,1,2,3\}$ 中有几个数可以满足不等式 $-3x^2<-14$?

(A)1 (B)2 (C)3
(D)4 (E)5

14. 图中 $ABCD$ 为一长方形,长方形中有三个内接圆。阴影部分的面积取最接近的整数是多少平方厘米?

(A)41 (B)43 (C)47
(D)36 (E)45



following are altered because of his mistake?

●Mean
●Median
●Minimum test score
●Range

(A)0 (B)1 (C)2
(D)3 (E)4

10. A sand pit is constructed in the shape of a rectangular prism 10 m long, 50 cm deep and 2 m wide. If the pit is already half-full, how much more sand, in m^3, is needed to completely fill the pit?

(A)6 (B)5 (C)20
(D)7.5 (E)10

11. The value of $\dfrac{1}{1+\dfrac{1}{1+\dfrac{1}{2}}}$ is

(A)$\frac{3}{5}$ (B)$\frac{5}{3}$ (C)$\frac{1}{3}$
(D)3 (E)$\frac{3}{2}$

12. Triangle ABC has vertices at $A(1,0)$, $B(21,0)$ and $C(21,21)$. The perimeter of the triangle is

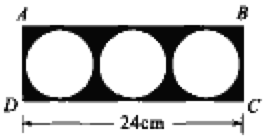
(A)70 (B)42 (C)64
(D)72 (E)63

13. How many numbers from the set $\{-5,-4,-3,-2,-1,0,1,2,3\}$ satisfy the inequality $-3x^2<-14$?

(A)1 (B)2 (C)3
(D)4 (E)5

14. In the diagram, $ABCD$ is a rectangle, and three circles are positioned as shown. The area of the shaded region, rounded to the nearest cm^2, is

(A)41 (B)43 (C)47
(D)36 (E)45



15. 字母 G,A,U,S 和 S 分别写在五块砖上,若艾米从中任意取两块砖,问她得到两个 S 的概率是多少?

(A)$\frac{3}{5}$　　(B)$\frac{2}{5}$　　(C)$\frac{1}{8}$

(D)$\frac{1}{10}$　　(E)$\frac{1}{20}$

16. 4 个连续整数的和是 5 的倍数。问关于这 4 个整数,下列哪个论述总是正确的?

(A)4 个整数的和的最后一位数是 5

(B)最大的一个整数的最后一位数是 9

(C)最小的一个整数是奇数

(D)没有任何一个数是 5 的倍数

(E)有一个数的最后一位数是 3

17. 卡米拉的 5 美分硬币和 10 美分硬币总计为 3.60 美元。若她的 5 美分硬币是 10 美分硬币,而 10 美分硬币是 5 美分硬币,则她会有 5.40 美元。问卡米拉有多少个 5 美分硬币和 10 美分硬币?

(A)56　　(B)57　　(C)58

(D)60　　(E)61

18. 在后院中加伯林娜有 12 棵西红柿树种成一排。当她走过这一排时,她发现每棵树上的西红柿比前一棵树上的西红柿多一个。这一排共有 186 个西红柿,问最后一棵树上有多少个西红柿?

(A)15　　(B)16　　(C)20

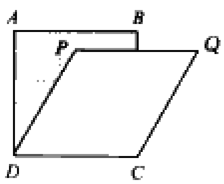
(D)21　　(E)22

19. 如图所示,$ABCD$ 为一正方形,面积为 25 平方厘米。若 $PQCD$ 是一菱形,面积为 20 平方厘米。问阴影部分的面积是多少平方厘米?

(A)12　　(B)10

(C)11　　(D)12.5

(E)9



15. The letters G, A, U, S, and S are written on five tiles, one letter per tile. If Amy selects two tiles at random, what is the probability she gets two S's?

(A)$\frac{3}{5}$　　(B)$\frac{2}{5}$　　(C)$\frac{1}{8}$

(D)$\frac{1}{10}$　　(E)$\frac{1}{20}$

16. The sum of four consecutive whole numbers is a multiple of 5. Which of the following statements about these four numbers is always true?

(A) The sum of the numbers ends in a 5

(B) The largest number ends in a 9

(C) The smallest number is odd

(D) None of the numbers are multiples of 5

(E) One of the numbers ends in a 3

17. Carmina has a total of \$3.60 in nickels and dimes. If her dimes were nickels and her nickels were dimes, then she would have \$5.40. How many nickels and dimes does Carmina have?

(A)56　　(B)57　　(C)58

(D)60　　(E)61

18. In her backyard garden, Gabriella has 12 tomato plants in a row. As she walks along the row, she notices that each plant in the row has one more tomato than the plant before. If she counts 186 tomatoes in total, how many tomatoes are there on the last plant in the row?

(A)15　　(B)16　　(C)20

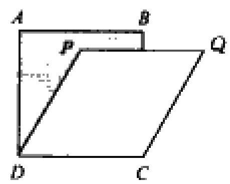
(D)21　　(E)22

19. In the diagram, $ABCD$ is a square with area 25 cm^2. If $PQCD$ is a rhombus with area 20 cm^2, the area of the shaded region, in cm^2, is

(A)12　　(B)10

(C)11　　(D)12.5

(E)9



20. 如图所示在方格中放有正整数,并使得横向、纵向及对角线方向上的数的乘积相等。一些方格中已填有数字。问 N 可以有多少不同的取值?

N		24
	12	
6		

(A)4 (B)15

(C)9 (D)6

(E)12

20. In the diagram, a positive integer is to be placed in each of the nine boxes so that the products of the numbers in each row, column, and diagonal are equal. Some of the entries are already filled in. The number of possible values for N is

N		24
	12	
6		

(A)4 (B)15

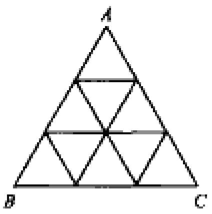
(C)9 (D)6

(E)12

试卷十七

Test 17

1. 如图所示,有 9 个小等边三角形组成$\triangle ABC$。若小三角形的周长为 6 厘米,问$\triangle ABC$的周长是多少厘米?



(A)18 (B)24 (C)27 (D)36 (E)54

2. 如果 $x=-4, y=4$,问下列那个表达式给出的值最大?

(A)$\frac{x}{y}$ (B)$y-1$ (C)$x-1$ (D)$-xy$ (E)$x+y$

3. 同时抛掷两枚硬币,问显示同样“头”面的概率是多少?

(A)0 (B)1 (C)$\frac{1}{2}$ (D)$\frac{1}{3}$ (E)$\frac{1}{4}$

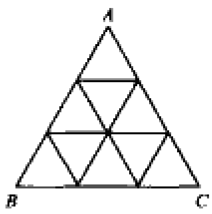
4. 一个湖的水面高出海平面 180 米,湖的底面则比海平面低 220 米。问湖水在这一点实际有多深?

(A)40 米 (B)300 米 (C)380 米 (D)400 米 (E)500 米

5. 矩形盒子的体积为 6 480 立方厘米,三边长度比为 2:3:5。问最短边的长度是多少厘米?

(A)6 (B)10 (C)12 (D)8 (E)16

1. $\triangle ABC$ is constructed from nine small, equilateral triangles, as shown. If the perimeter of each of the nine small triangles is 6 cm, then the perimeter of $\triangle ABC$, in cm, is



(A)18 (B)24 (C)27 (D)36 (E)54

2. If $x=-4$ and $y=4$, which of the following expressions gives the largest answer?

(A)$\frac{x}{y}$ (B)$y-1$ (C)$x-1$ (D)$-xy$ (E)$x+y$

3. Two fair coins are tossed at the same time. What is the probability they will both land as "HEADS"?

(A)0 (B)1 (C)$\frac{1}{2}$ (D)$\frac{1}{3}$ (E)$\frac{1}{4}$

4. The water surface of a Lake is at an elevation of 180 m *above* sea level. The lowest point of the lake floor is 220 m *below* sea level. What is the actual depth of the lake at this point?

(A)40 m (B)300 m (C)380 m (D)400 m (E)500 m

5. The volume of a rectangular box is 6 480 cubic centimetres, and the lengths of the sides are in the ratio 2 : 3 : 5. The length, in centimetres, of the shortest side of the box is

(A)6 (B)10 (C)12 (D)8 (E)16

6. 路茜按 5 千米/小时的速度行走。问她行走 1.5 千米需要花多少分钟?

(A)20 (B)24 (C)18
(D)15 (E)7.5

7. 将 $\sqrt{36}$, 35.2, 35.19 和 5^2 从小到大排序,问下列哪一排序是正确的?

(A) 5^2, 35.19, 35.2, $\sqrt{36}$
(B) 35.19, 35.2, 5^2, $\sqrt{36}$
(C) 5^2, $\sqrt{36}$, 35.19, 35.2
(D) $\sqrt{36}$, 5^2, 35.19, 35.2
(E) $\sqrt{36}$, 5^2, 35.2, 35.19

8. 特日拉从家到学校的路边有 13 棵树,这一天特日拉在去学校的路上从第一棵树开始,每两棵树用粉笔在树上作记号。回家的路上从第一棵树开始,每三棵树用粉笔在树上作记号,问特日拉到家后 13 棵树中有多少棵没有被作记号?

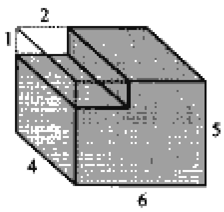
(A)6 (B)4 (C)8
(D)2 (E)7

9. p、q 和 r 为正整数,并且 $\frac{1}{p}+\frac{1}{q}+\frac{1}{r}=1$, $pq=s$, 问 $p+q$ 等于下列哪一项?

(A) $\frac{rs}{r-1}$ (B) $1-\frac{1}{r}-\frac{1}{s}$ (C) $\frac{r-1}{rs}$
(D) $\frac{s}{r}(r-1)$ (E) $s(r-1)$

10. 图中阴影固体的体积是多少?

(A)8 (B)112
(C)113 (D)120
(E)128



11. 锐角三角形 ABC 的三边边长分别为 $x-1$、x

6. Ruth walks at a constant speed of 5 km/h. How many minutes will it take her to walk 1.5 km?

(A)20 (B)24 (C)18
(D)15 (E)7.5

7. When the numbers $\sqrt{36}$, 35.2, 35.19and 5^2 are arranged from smallest to largest, the correct ordering is

(A) 5^2, 35.19, 35.2, $\sqrt{36}$
(B) 35.19, 35.2, 5^2, $\sqrt{36}$
(C) 5^2, $\sqrt{36}$, 35.19, 35.2
(D) $\sqrt{36}$, 5^2, 35.19, 35.2
(E) $\sqrt{36}$, 5^2, 35.2, 35.19

8. There are 13 trees on one side of the street on Trina's way from her house to school. Today, on her way to school, Trina put a chalk mark on every other tree, starting with the first she passed. When she goes home from school, she will put achalk mark on every third tree, again starting with the first one she passes. By the time Trina arrives at home, how many of the 13 trees will *not* have a chalk mark on them?

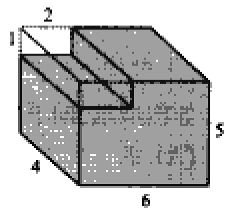
(A)6 (B)4 (C)8
(D)2 (E)7

9. p, q and r are positive numbers for which $\frac{1}{p}+\frac{1}{q}+\frac{1}{r}=1$ and $pq=s$, then $p+q$ equals

(A) $\frac{rs}{r-1}$ (B) $1-\frac{1}{r}-\frac{1}{s}$ (C) $\frac{r-1}{rs}$
(D) $\frac{s}{r}(r-1)$ (E) $s(r-1)$

10. In the diagram, the volume of the shaded solid is

(A)8 (B)112
(C)113 (D)120
(E)128

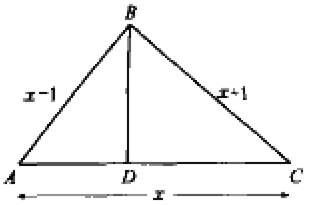


11. The lengths of the sides of the acute angled

和 $x+1$，$BD\perp AC$。问 $CD-DA$ 等于多少？

(A)$\frac{x}{9}$　(B)2　(C)$\frac{x}{8}$

(D)4　(E)$\sqrt{x}$



12. 如果 $2^a=8$，$a=3c$，问 c 等于多少？

(A)0　(B)$\frac{3}{4}$　(C)1

(D)$\frac{4}{3}$　(E)6

13. 一次小测试中 8 个学生的成绩分别为 6,7,7,8,8,8,9 和 10。问哪一个成绩可以去掉，使余下的 7 个成绩与原来 8 个成绩有相同的中间值和取值范围，但平均值会增加？

(A)6　(B)7　(C)8

(D)9　(E)10

14. 克洛伊用英文字母做了一密码，即给每一个字母一个数值。然后将每个字母的表值相加以计算每个字的值。用她的密码，BAT 的数值为 6。同样地，她的密码给出 CAT 的值为 8，CAR 的值为 12。问依据她的密码 BAR 的数值是多少？

(A)10　(B)14　(C)18

(D)12　(E)20

15. 如图所示，问下列哪段最大？

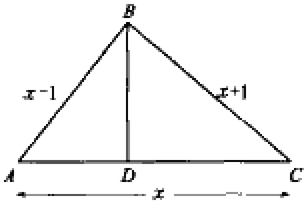
(A)AE　(B)$CD+CF$　(C)$AC+CF$

(D)FD　(E)$AC+CE$

triangle ABC are $x-1$, x and $x+1$. BD is perpendicular to AC. Then $CD-DA$ equals

(A)$\frac{x}{9}$　(B)2　(C)$\frac{x}{8}$

(D)4　(E)$\sqrt{x}$



12. If $2^a=8$ and $a=3c$, then c equals

(A)0　(B)$\frac{3}{4}$　(C)1

(D)$\frac{4}{3}$　(E)6

13. The scores of eight students on a quiz are 6, 7, 7, 8, 8, 8, 9, and 10. Which score should be removed to leave seven scores with the same mode and range as the original eight scores, but with a higher average(mean)?

(A)6　(B)7　(C)8

(D)9　(E)10

14. Chole has made a code out of the alphabet by assigning a numerical value to each letter. She then assigns a numerical value to a word by adding up the numerical values of the letters in the word. Using her code, the numerical value of BAT is 6. Also, her code gives numerical values of 8 to CAT and 12 to CAR. Using her code, what is the numerical value of BAR?

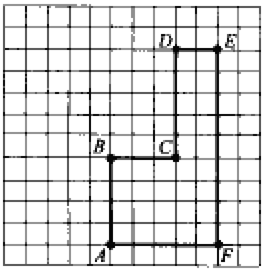
(A)10　(B)14　(C)18

(D)12　(E)20

15. In the diagram, which of the following is the largest?

(A)AE　(B)$CD+CF$　(C)$AC+CF$

(D)FD　(E)$AC+CE$



16. 在托尼的地图上，从一个城市到另一个城市的距离是 21 厘米。两个城市的实际距离是 1 050 千米，问托尼的地图的比例是多少？

(A)1∶50 000　　(B)1∶200 000

(C)1∶500 000　　(D)1∶2 000 000

(E)1∶5 000 000

17. 从一个装满水容积为 1.5 升的瓶中向一空杯子倒水，直到瓶中和杯子中的水都达到各自容积的四分之三。问杯子的容积是多少？

(A)0.5 升　　(B)0.75 升　　(C)1.125 升

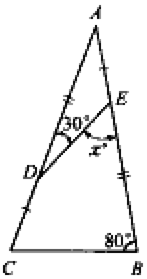
(D)0.6 升　　(E)0.4 升

18. 问图中 x 的度数是多少？

(A)40°　　(B)45°

(C)50°　　(D)55°

(E)60°

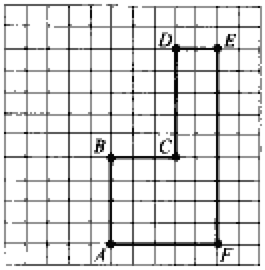


19. 假设 x 是一个三位数 ABC，y 是另一个三位数 CBA，e 数字 C 和 A 都不为 0。如果 $x-y=495$，问 x 有多少种不同的三位数？

(A)50　　(B)40　　(C)24

(D)36　　(E)32

20. 一个大长方形块的尺寸为 $n\times11\times10$，它是由



16. On Tony's map, the distance from one city to another city is 21 cm. The actual distance between these two cities is 1 050 km. What is the scale of Tony's map?

(A)1∶50 000　　(B)1∶200 000

(C)1∶500 000　　(D)1∶2 000 000

(E)1∶5 000 000

17. Water is poured from a full 1.5 L bottle into an empty glass until both the glass and the bottle are $\frac{3}{4}$ full. What is the volume of the glass?

(A)0.5 L　　(B)0.75 L　　(C)1.125 L

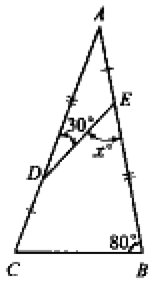
(D)0.6 L　　(E)0.4 L

18. In the diagram, the value of x is

(A)40°　　(B)45°

(C)50°　　(D)55°

(E)60°



19. Let x be the three-digit number with digits ABC and y be the three-digit number with digits CBA. The digits A and C are not 0. If $x-y=495$, how many possibilities are there for x?

(A)50　　(B)40　　(C)24

(D)36　　(E)32

20. A large block, which has dimensions n by 11 by

一些单位立方体(注:1×1×1)和一个2×1×1的长方体构成。2×1×1长方体在大长方形块中有2 362个位置可以放置。问n值是多少?

(A)7　(B)8　(C)9

(D)10　(E)11

10, is made up of a number of unit cubes and one 2 by 1 by 1 block. There are exactly 2 362 positions in which the 2 by 1 by 1 block can be placed. What is the value of n?

(A)7　(B)8　(C)9

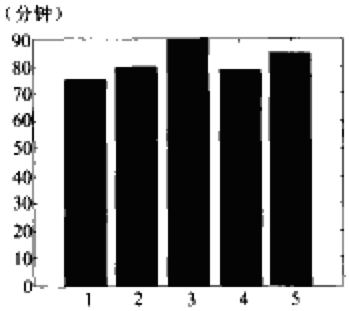
(D)10　(E)11

第三部分

试 卷 一

Test 1

1. 5名马拉松选手所用的比赛时间如图所示。最快的选手与最慢的选手用时大约相差多少时间?



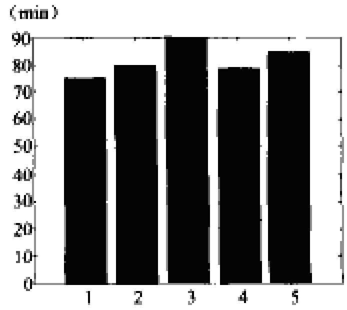
(A)15 分钟　(B)20 分钟　(C)6 分钟
(D)12 分钟　(E)1 分钟

2. 计算 2 002 − 2 001 + 2 000 − 1 999 + ⋯ + 2 − 1 的值
(A)2 002　(B)0　(C) − 1
(D)1 001　(E) − 1 001

3. 一组 10 个数,每个数都加上 20,则这一组数的平均值有什么变化?
(A)不变　(B)增加 20
(C)增加 200　(D)增加 10
(E)增加 2

4. 在一家超市中,50 毫升牙膏的售价为 2.99 美元,100 毫升牙膏的售价为 5.09 美元。问买两支 50 毫升牙膏比买一支 100 毫升牙膏多花的钱约为百分之几?
(A)20%　(B)18%　(C)15%
(D)12%　(E)10%

1. The times of five marathon runners are shown in the graph. The difference between the times of the fastest and slowest runners is approximately



(A)15 min　(B)20 min　(C)6 min
(D)12 min　(E)1 min

2. 2 002 − 2 001 + 2 000 − 1 999 + ⋯ + 2 − 1 equals
(A)2 002　(B)0　(C) − 1
(D)1 001　(E) − 1 001

3. If each number in a set of ten numbers is increased by 20, then the average of the set
(A)remains the same　(B)is increased by 20
(C)is increased by 200　(D)is increased by 10
(E)is increased by 2

4. In a supermarket a 50 ml tube of toothpaste costs \$2.99 and a 100 ml tube costs \$5.09. Approximately what percentage do you pay more if you buy two 50 ml tubes instead of one 100 mL tube?
(A)20%　(B)18%　(C)15%
(D)12%　(E)10%

5. 若 $f(a)=a-2$, $g(p,q)=p^2+q$, 则 $g(3,f(4))$ 等于多少?

(A)13　　(B)28　　(C)7
(D)18　　(E)11

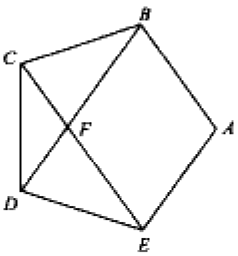
6.

$$\begin{array}{r} 2P4 \\ +\quad Q5 \\ +\quad R7 \\ \hline 406 \end{array}$$

在上面给出的加法求和算式中,每个字母代表 0 到 9 中任意一个不同的数字,问 R 不可能是下列哪一个数?

(A)1　　(B)3　　(C)6
(D)8　　(E)9

7. 如图所示一正五边形 $ABCDE$, BD 与 CE 相交于 F 点。问 $\angle DFC$ 为多少度?



(A)36°　　(B)108°
(C)72°　　(D)100°
(E)54°

8. 一位骑车人注意到她已经骑过的一半路程的平均速度为 30 公里/小时。如果她希望骑完整个路程的平均速度为 40 公里/小时,则下一半路程的平均速度要达到多少公里/小时?

(A)45 公里/小时　　(B)50 公里/小时
(C)60 公里/小时　　(D)54 公里/小时
(E)不能确定

9. 有多少个两位数是其个位数与十位数之和的 7 倍?

(A)4 个　　(B)5 个　　(C)6 个
(D)7 个　　(E)7 个以上

10. $7^{2\,002}$除以 10 的余数是多少?

(A)1　　(B)3　　(C)7
(D)9　　(E)5

5. If $f(a)=a-2$, and $g(p,q)=p^2+q$, then $g(3,f(4))$ equals

(A)13　　(B)28　　(C)7
(D)8　　(E)11

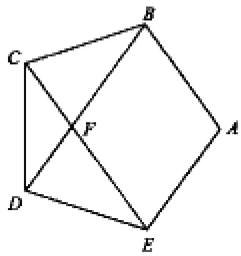
6.

$$\begin{array}{r} 2P4 \\ +\quad Q5 \\ +\quad R7 \\ \hline 406 \end{array}$$

In the given addition sum, each letter stands for a different digit from 0 to 9. Which of the following values is not a possible value for R?

(A)1　　(B)3　　(C)6
(D)8　　(E)9

7. The figure shows a regular pentagon $ABCDE$. BD and CE are intersected at F. The size of angle $\angle DFC$ is?



(A)36°　　(B)108°
(C)72°　　(D)100°
(E)54°

8. A cyclist notices that her average speed when she has covered exactly half the total distance of her race is 30 km/h. What should her average speed over the second half of the race be if she wants to finish the race with an average speed of 40 km/h?

(A)45 km/h　　(B)50 km/h
(C)60 km/h　　(D)54 km/h
(E)impossible to determine

9. How many two-digit numbers are exactly seven times the sum of their digits?

(A)4　　(B)5　　(C)6
(D)7　　(E)more than 7

10. The remainder when $7^{2\,002}$ is divided by 10 is

(A)1　　(B)3　　(C)7
(D)9　　(E)5

11.

1
3 5
7 9 11
13 15 17 19
21 23 25 27 29

如图所示,一些连续的奇数按行排列。如果按此规律排列,则第 51 行中间的数是多少?

(A)2 601 (B)2 500
(C)2 704 (D)2 809
(E)2 401

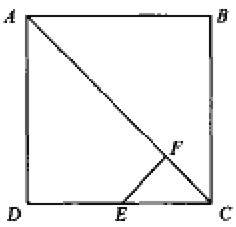
12. 若 $x+y=-1$,则 xy 的最大值是多少?

(A)0 (B)2 (C)$\frac{1}{4}$
(D)$-\frac{1}{4}$ (E)-1

13. 若 p 和q 是正整数,问有多少对数可以满足 $2p+3q=25$?

(A)2 对 (B)3 对 (C)4 对
(D)5 对 (E)5 对以上

14. 图中 $ABCD$ 为正方形,边长为 $7\sqrt{2}$厘米,E 是 DC 上的一点,$EC=2\sqrt{2}$厘米,$\angle CFE=90°$。$AFED$ 的面积是多少平方厘米?



(A)2 (B)49 (C)7
(D)45 (E)47

15. 若 $n!=n\times(n-1)\times(n-2)\times\cdots\times1$,则在无限数列 $1!, 1!+2!, 1!+2!+3!, \cdots, 1!+2!+3!+4!+\cdots+n!\cdots$中有几项为完全平方数?

(A)0 (B)2 (C)3
(D)5 (E)5 项以上

11.

1
3 5
7 9 11
13 15 17 19
21 23 25 27 29

Consecutive odd numbers are arranged in rows as shown. If the rows are continued in the same pattern, then the middle number of row 51 is

(A)2 601 (B)2 500
(C)2 704 (D)2 809
(E)2 401

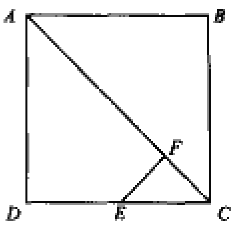
12. Given that $x+y=-1$, the largest value of xy is

(A)0 (B)2 (C)$\frac{1}{4}$
(D)$-\frac{1}{4}$ (E)-1

13. If p and q are positive integers, how many pairs (p,q) satisfy $2p+3q=25$?

(A)2 (B)3 (C)4
(D)5 (E)more than 5

14. In the given diagram $ABCD$ is a square with sides $7\sqrt{2}$ cm. E is a point on DC such that $EC=2\sqrt{2}$ cm and angle $\angle CFE=90°$. The area of $AFED$ in cm^2 is



(A)2 (B)49 (C)7
(D)45 (E)47

15. If $n!=n\times(n-1)\times(n-2)\times\cdots\times1$, then the number of perfect squares in the infinite sequence $1!, 1!+2!, 1!+2!+3!, \cdots, 1!+2!+3!+4!+\cdots+n!\cdots$ is

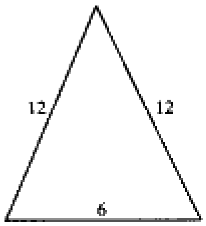
(A)0 (B)2 (C)3
(D)5 (E)more than 5

16. 通过三角形三个顶点的圆的半径是多少?

(A)$\frac{8\sqrt{15}}{5}$　(B)$\frac{7\sqrt{15}}{5}$

(C)$3\sqrt{15}$　(D)$3\sqrt{5}$

(E)$3\sqrt{2}$



17. 有多少个三位数,其各位数的乘积是质数(注:1不是质数)?

(A)15　(B)12　(C)17

(D)20　(E)21

18. 若 a,b 和 c 是整数,并且 $0<a<b<c$, $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=1$, c 等于多少?

(A)6　(B)8　(C)4

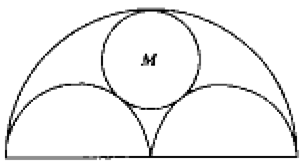
(D)2　(E)不能确定

19. 有数列 $2^5-2, 3^5-3, \cdots, n^5-n, \cdots$,问可以被数列各项除尽的最大值是多少?

(A)1　(B)2　(C)3

(D)6　(E)5

20. 半径为$\frac{1}{2}$的两个半圆相切,并且内接于一个半径为1的半圆中,另有一个圆 M 与三个半圆相切。圆 M 的半径是多少?



(A)$\frac{1}{3}$　(B)$\frac{1}{2}$　(C)$\frac{1}{\sqrt{3}}$

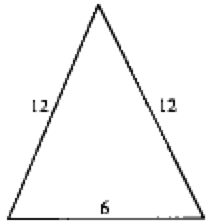
(D)$\frac{1}{\sqrt{5}}$　(E)$\frac{2}{\sqrt{6}}$

16. The radius of the circle passing through the vertices of the triangle is

(A)$\frac{8\sqrt{15}}{5}$　(B)$\frac{7\sqrt{15}}{5}$

(C)$3\sqrt{15}$　(D)$3\sqrt{5}$

(E)$3\sqrt{2}$



17. How many three-digit positive integers are there such that the product of their digits is a prime number? (Remember 1 is not a prime number.)

(A)15　(B)12　(C)17

(D)20　(E)21

18. If a,b and c are integers with $0<a<b<c$ and $\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=1$, the value of c is

(A)6　(B)8　(C)4

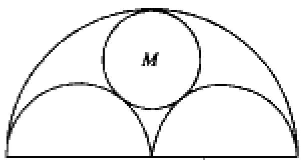
(D)2　(E)impossible to determine

19. Of the numbers below, the largest one that divides every term of the sequence $2^5-2, 3^5-3, \cdots, n^5-n, \cdots$, is

(A)1　(B)2　(C)3

(D)6　(E)5

20. Two semi-circles (each of radius $\frac{1}{2}$) touch each other, and a larger semi-circle of radius 1 touches both of them. The radius of the circle M which touches all three semi-circles is



(A)$\frac{1}{3}$　(B)$\frac{1}{2}$　(C)$\frac{1}{\sqrt{3}}$

(D)$\frac{1}{\sqrt{5}}$　(E)$\frac{2}{\sqrt{6}}$

试 卷 二

Test 2

1. 计算$(1-2)^{2\,003}$的值。

(A)-2　(B)-1　(C)1
(D)$-2\,003$　(E)2

2. 问$(0.1)^3 \div 0.01$ 等于多少?

(A)0.01　(B)0.1　(C)1
(D)0.001　(E)10

3. 计算$(2^{-1}+3^{-1})^{-1}$的值。

(A)5　(B)$\frac{1}{6}$　(C)6
(D)$\frac{2}{3}$　(E)$\frac{6}{5}$

4. 对于任意 3 个不同的数 a、b、c,定义 $a \# b \# c = \frac{a+b}{c-a}$,则 $1\#2\#3$ 等于多少?

(A)$\frac{3}{2}$　(B)$\frac{1}{2}$　(C)$\frac{2}{3}$
(D)$-\frac{3}{2}$　(E)1

5. 若 $2^x=2\,003$,问 x 约为下列哪一个数值?

(A)11　(B)8　(C)10
(D)12　(E)9

6. 若 $x>0$,则$\sqrt{x\sqrt{x\sqrt{x}}}$,等于下列哪一项?

(A)$x^{\frac{3}{2}}$　(B)$x^{\frac{5}{4}}$　(C)$x^{\frac{1}{8}}$
(D)$x^{\frac{3}{8}}$　(E)$x^{\frac{7}{8}}$

7. 5 场比赛后,一个队每场比赛的平均分为 28 分。要使平均分增加 2 分,问第 6 场比赛应得多少分?

1. $(1-2)^{2\,003}$ is equal to

(A)-2　(B)-1　(C)1
(D)$-2\,003$　(E)2

2. $(0.1)^3 \div 0.01$ is equal to

(A)0.01　(B)0.1　(C)1
(D)0.001　(E)10

3. $(2^{-1}+3^{-1})^{-1}$ is equal to

(A)5　(B)$\frac{1}{6}$　(C)6
(D)$\frac{2}{3}$　(E)$\frac{6}{5}$

4. If for any three different numbers a, b, c, we define $a \# b \# c = \frac{a+b}{c-a}$, then $1\#2\#3$ is equal to

(A)$\frac{3}{2}$　(B)$\frac{1}{2}$　(C)$\frac{2}{3}$
(D)$-\frac{3}{2}$　(E)1

5. If $2^x=2\,003$, then the closest integer to x is

(A)11　(B)8　(C)10
(D)12　(E)9

6. If $x>0$, then $\sqrt{x\sqrt{x\sqrt{x}}}$ equals

(A)$x^{\frac{3}{2}}$　(B)$x^{\frac{5}{4}}$　(C)$x^{\frac{1}{8}}$
(D)$x^{\frac{3}{8}}$　(E)$x^{\frac{7}{8}}$

7. After five games, a team has an average of 28 points per game. In order to increase their average by 2 points, how many points must they score in the sixth game?

(A)2 (B)12 (C)56
(D)30 (E)40

8. 已知 $q=3\sqrt{3}$，$r=1+2\sqrt{3}$，$s=3+\sqrt{3}$，问下列哪一项是正确的？
(A)$q>r>s$ (B)$q>s>r$ (C)$r>q>s$
(D)$s>q>r$ (E)$s>r>q$

9. 若 $\sqrt{\left(\frac{4+\sqrt{x+3}}{6}\right)^2}+2=3$，则 x 等于多少？
(A)22 (B)6 (C)3
(D)1 (E)5

10. $n!=n\times(n-1)\times(n-1)\times\cdots\times2\times1$（例如 $4!=4\times3\times2\times1=24$），问下列哪一个数值最大？
(A)(70!)(30!) (B)(50!)(50!)
(C)(40!)(60!) (D)(80!)(20!)
(E)100!

11. 一个五位数 $a6a41$，其中的 a 代表相同的数字。若这个数可以被 9 除尽，则 a 是多少？
(A)3 (B)7 (C)6
(D)8 (E)5

12. 索菲每两年参加一次马拉松比赛，当她第七次参加比赛时，七个年份的数字之和为 13 951。她第一次参加比赛是在哪一年？
(A)1978 (B)1982 (C)1985
(D)1987 (E)1991

13. 一家公司有两个公式计算每个月的电费。若用电量为 E，则费用 C 可用下面两个公式计算：

$$C=60+0.2E \quad 或 \quad C=0.3(E-50)$$

问用电量在下列哪一范围内，第一个公式计算出的费用要低一些？
(A)$E>0$ (B)$450<E<750$
(C)$0<E<750$ (D)$0<E<450$
(E)$E>750$

(A)2 (B)12 (C)56
(D)30 (E)40

8. Given $q=3\sqrt{3}$, $r=1+2\sqrt{3}$, $s=3+\sqrt{3}$, which of the following is true?
(A)$q>r>s$ (B)$q>s>r$ (C)$r>q>s$
(D)$s>q>r$ (E)$s>r>q$

9. If $\sqrt{\left(\frac{4+\sqrt{x+3}}{6}\right)^2}+2=3$, then x is equal to
(A)22 (B)6 (C)3
(D)1 (E)5

10. Given that $n!=n\times(n-1)\times\cdots\times2\times1$ (e.g., $4!=4\times3\times2\times1=24$), which one of the following numbers is the largest?
(A)(70!)(30!) (B)(50!)(50!)
(C)(40!)(60!) (D)(80!)(20!)
(E)100!

11. In the 5-digit number $a6a41$ each of the a's represents the same digit. If the number is divisible by 9, then the digit represented by a is
(A)3 (B)7 (C)6
(D)8 (E)5

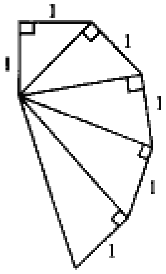
12. Sophie runs a Marathon every second year. When she has run her seventh, the sum of all the years in which she has run is 13951. In which year did she run her first one ?
(A)1978 (B)1982 (C)1985
(D)1987 (E)1991

13. A company has two different formulae for calculating monthly charges for electricity. For a consumer using an amount E of electricity, the cost C is given by either

$$C=60+0.2E \text{ or } C=0.3(E-50)$$

The first formula gives cheaper electricity when
(A)$E>0$ (B)$450<E<750$
(C)$0<E<750$ (D)$0<E<450$
(E)$E>750$

14. 如图所示，按序排列的前 5 个三角形都是直角三角形。若按此序排列 100 个三角形，问有多少线段的长度为整数？

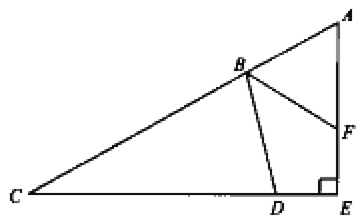


(A)101　(B)102
(C)100　(D)109
(E)110

15. 若 k^3+2k^2 为一个奇数的平方，确定 k 的最小正整数值。

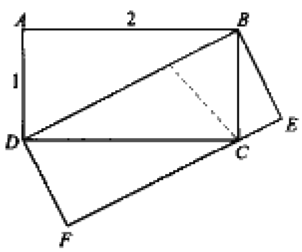
(A)2　(B)14
(C)23　(D)1
(E)7

16. 图中 $AB=AF$，$BC=CD$，问$\angle DBF$ 是多少度？



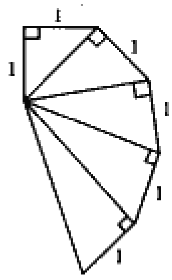
(A)30°　(B)45°
(C)22.5°　(D)60°
(E)67.5°

17. 长方形 $ABCD$ 各边的尺寸如图所示。长方形 $BDFE$ 的面积是多少？



(A)2　(B)$\sqrt{2}$
(C)$\sqrt{5}$　(D)$\frac{4}{\sqrt{5}}$
(E)$1+\sqrt{2}$

14. The first five triangles in a sequence of right-angled triangles are shown in the figure. If there are 100 triangles in the sequence, how many of the line segments have integer lengths?

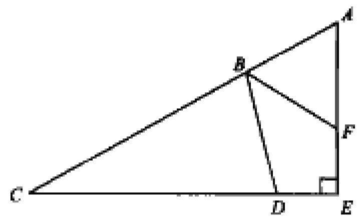


(A)101　(B)102
(C)100　(D)109
(E)110

15. Determine the smallest positive value of the integer k such that k^3+2k^2 is the square of an odd integer.

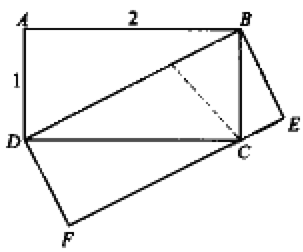
(A)2　(B)14
(C)23　(D)1
(E)7

16. In the figure $AB=AF$ and $BC=CD$. The size of angle DBF is



(A)30°　(B)45°
(C)22.5°　(D)60°
(E)67.5°

17. In the figure, rectangle $ABCD$ has dimensions as shown. The area of rectangle $BDFE$ is



(A)2　(B)$\sqrt{2}$
(C)$\sqrt{5}$　(D)$\frac{4}{\sqrt{5}}$
(E)$1+\sqrt{2}$

18.

H
A A
R R R
M M M M
O O O
N N
Y

从上到下有多少种不同的路径可以拼出单词 HARMONY?

(A)12 (B)20 (C)8
(D)10 (E)32

19. 计算 $33\ 333^2 + 22\ 222$ 后,这个数的各位数之和是多少?

(A)15 (B)25 (C)22
(D)10 (E)20

20. 一个三位数 kmn,且 $64k + 8m + n = 403$,问下列哪一个数是这个三位数?

(A)623 (B)563
(C)403 (D)643
(E)答案不唯一

18.

H
A A
R R R
M M M M
O O O
N N
Y

How many paths from top to bottom spell HARMONY?

(A)12 (B)20 (C)8
(D)10 (E)32

19. When $33\ 333^2 + 22\ 222$ is wirtten as a single decimal number, the sum of its digits is

(A)15 (B)25 (C)22
(D)10 (E)20

20. If the digits k, m, n of the 3-digit number kmn satisfy $64k + 8m + n = 403$, then the number kmn is

(A)623 (B)563
(C)403 (D)643
(E)not possible to be uniquely determined

试 卷 三

Test 3

1. 计算$(0.2)^4$的值。

(A)0.8　　(B)0.16
(C)0.001 6　　(D)0.000 016
(E)0.000 8

2. 世界上最高的建筑物约为多少米?

(A)400 米　　(B)40 米
(C)4 000 米　　(D)4 米
(E)40 000 米

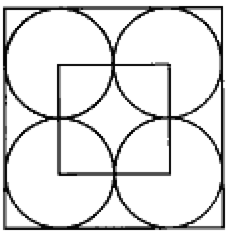
3. 计算$\frac{37^2+111}{37}$的值。

(A)4　　(B)40
(C)113　　(D)148
(E)37

4. 问$\frac{4\ 444^4}{2\ 222^4}$等于多少?

(A)8 888　　(B)$2\ 222^4$
(C)2　　(D)2 222
(E)16

5. 如图所示,一个正方形中有四个相切的大小相等的圆,它们的圆心是一个小正方形的顶点。若小正方形的面积为 4,则大正方形的面积是多少?



(A)16　　(B)8
(C)$4\sqrt{2}$　　(D)12
(E)4π

1. $(0.2)^4$ equals

(A)0.8　　(B)0.16
(C)0.001 6　　(D)0.000 016
(E)0.000 8

2. The height of the tallest building on earth is about

(A)400 m　　(B)40 m
(C)4 000 m　　(D)4 m
(E)40 000 m

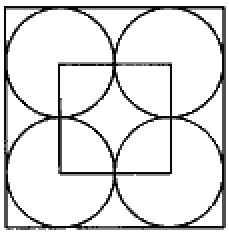
3. $\frac{37^2+111}{37}$ equals

(A)4　　(B)40
(C)113　　(D)148
(E)37

4. $\frac{4\ 444^4}{2\ 222^4}$ equals

(A)8 888　　(B)$2\ 222^4$
(C)2　　(D)2 222
(E)16

5. Four identical circles fit inside a square as shown. Their centres are the vertices of the smaller square. If the smaller square has area 4, then the area of the larger square is



(A)16　　(B)8
(C)$4\sqrt{2}$　　(D)12
(E)4π

6. 计算 $1-\dfrac{1-\dfrac{1-\frac{1}{2}}{1+\frac{1}{2}}}{1+\dfrac{1+\frac{1}{2}}{1-\frac{1}{2}}}$ 的值。

(A)$\frac{7}{9}$ (B)$\frac{5}{6}$ (C)$\frac{1}{2}$

(D)$\frac{1}{3}$ (E)$\frac{3}{4}$

7. 若 $17x+51y=85$,则 $13x+39y$ 等于多少?

(A)不能确定 (B)61

(C)63 (D)65

(E)67

8. 数列$\cdots,k,m,n,p,0,1,1,2,3,5,8,\cdots$的每一项量是前两项之和。$k$ 的值是多少?

(A)-2 (B)3 (C)-3

(D)2 (E)-1

9. 计算 $2\ 004^2-2\ 003\times2\ 005$ 的值。

(A)0 (B)1 (C)-1

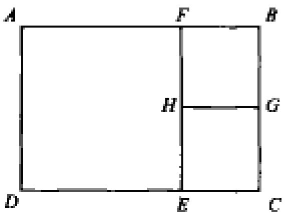
(D)2 004 (E)2 001

10. 有多少个整数 n 可使$\dfrac{n+3}{n-1}$为整数?

(A)7 (B)6 (C)5

(D)2 (E)8

11. 图中 $ABCD$ 为长方形, $AB=\sqrt{3}$, $BC=1$, $AFED$ 和 $FBGH$ 均为正方形。HE 为多长?



(A)$2-\sqrt{3}$ (B)$2\sqrt{3}-3$ (C)$\dfrac{\sqrt{3}}{6}$

(D)$7\sqrt{3}-12$ (E)$\sqrt{3}+2$

6. $1-\dfrac{1-\dfrac{1-\frac{1}{2}}{1+\frac{1}{2}}}{1+\dfrac{1+\frac{1}{2}}{1-\frac{1}{2}}}$ equals

(A)$\frac{7}{9}$ (B)$\frac{5}{6}$ (C)$\frac{1}{2}$

(D)$\frac{1}{3}$ (E)$\frac{3}{4}$

7. If $17x+51y=85$, then $13x+39y$ is

(A)impossible to determine (B)61

(C)63 (D)65

(E)67

8. In the sequence

$\cdots,k,m,n,p,0,1,1,2,3,5,8,\cdots$

each term is the sum of the two terms on its left. The value of k is

(A)-2 (B)3 (C)-3

(D)2 (E)-1

9. $2\ 004^2-2\ 003\times2\ 005$ equals

(A)0 (B)1 (C)-1

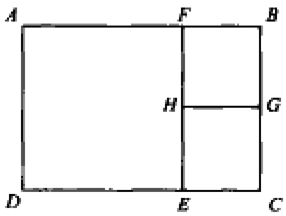
(D)2 004 (E)2 001

10. For how many integer values of n is $\dfrac{n+3}{n-1}$ an integer?

(A)7 (B)6 (C)5

(D)2 (E)8

11. In the diagram $ABCD$ is a rectangle with $AB=\sqrt{3}$ and $BC=1$. $AFED$ and $FBGH$ are squares. The length of HE is



(A)$2-\sqrt{3}$ (B)$2\sqrt{3}-3$ (C)$\dfrac{\sqrt{3}}{6}$

(D)$7\sqrt{3}-12$ (E)$\sqrt{3}+2$

12. 有多少个质数 p 可使 $p+1$ 为某一个数的平方？

(A)1　　(B)0　　(C)4

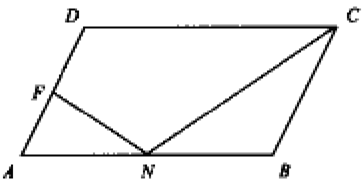
(D)3　　(E)无数个

13. 计算 $2^2\times3^3\times4^4\times5^{11}$ 后，问这个数的各位数之和是多少？

(A)9　　(B)207　　(C)14

(D)135　　(E)814

14. $ABCD$ 是平行四边形，F 是 AD 的中点，N 是 AB 的中点，$\triangle AFN$ 的面积是四边形 $FNCD$ 的面积的几分之几？



(A)$\frac{2}{7}$　　(B)$\frac{1}{6}$　　(C)$\frac{1}{5}$

(D)$\frac{1}{4}$　　(E)$\frac{1}{3}$

15. 在小于 100 000 的自然数中，有多少个数的第一位数是 9？

(A)10 000　　(B)11 110

(C)10 001　　(D)9 999

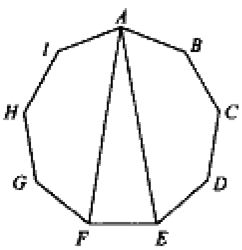
(E)11 111

16. 如图所示为一个正九边形，$\angle FAE$ 是多少度？

(A)10°　　(B)20°

(C)30°　　(D)40°

(E)25°



17. 如图所示，直角三角形 ABC 的两个直角边长分别为 a 和 b，阴影正方形的面积是三角形 ABC 的几分之几？

12. The number of prime numbers p such that $p+1$ is a square is

(A)1　　(B)0　　(C)4

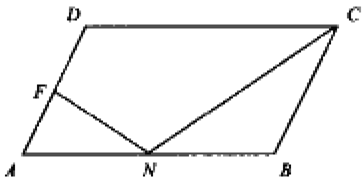
(D)3　　(E)infinite

13. If $2^2\times3^3\times4^4\times5^{11}$ is multiplied out, then the sum of the digits is

(A)9　　(B)207　　(C)14

(D)135　　(E)814

14. $ABCD$ is a parallelogram. F is the midpoint of AD and N is the midpoint of AB. The ratio of the area of $\triangle AFN$ to the area of quadrilateral $FNCD$ is



(A)$\frac{2}{7}$　　(B)$\frac{1}{6}$　　(C)$\frac{1}{5}$

(D)$\frac{1}{4}$　　(E)$\frac{1}{3}$

15. The number of natural numbers less than 100 000 which have 9 as their first digit is

(A)10 000　　(B)11 110

(C)10 001　　(D)9 999

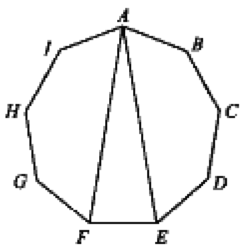
(E)11 111

16. The diagram shows a regular 9 - sided polygon. The size of angle FAE, in degrees, is

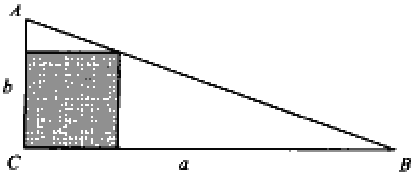
(A)10°　　(B)20°

(C)30°　　(D)40°

(E)25°



17. The right-angled triangle ABC has sides with lengths a and b as shown. The ratio of the area of the shaded square to the area of triangle ABC is



(A)$\frac{ab}{a+b}$　(B)$\frac{ab}{(b-a)^2}$　(C)$\frac{2ab}{a^2+b^2}$

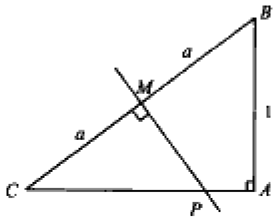
(D)$\frac{2ab}{(a+b)^2}$　(E)$\frac{ab}{(a+b)^2}$

18. 计算$\sqrt{2+\sqrt{3}}-\sqrt{2-\sqrt{3}}$的值。

(A)2　(B)$\sqrt{2}$　(C)$\sqrt{3}$

(D)1　(E)$12^{\frac{1}{4}}$

19. 图中 MP 是 BC 的垂直平分线，$AB=1$，问 MP 等于多少？

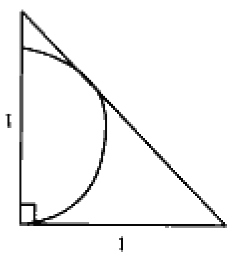


(A)$\frac{a}{\sqrt{2a^2-1}}$　(B)$a\sqrt{4a^2-1}$

(C)$\frac{a}{\sqrt{4a^2+1}}$　(D)$\frac{a}{\sqrt{4a^2-1}}$

(E)$\frac{1}{2}$

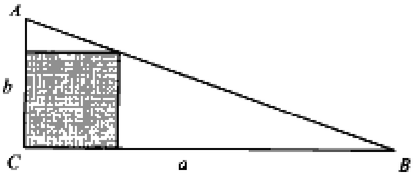
20. 如图所示，一个半圆内接于一个等腰直角三角形，半圆的半径是多少？



(A)$\frac{1}{\sqrt{2}}$　(B)$3-2\sqrt{2}$

(C)$\frac{1}{2}$　(D)$2-\sqrt{2}$

(E)$\sqrt{2}-1$



(A)$\frac{ab}{a+b}$　(B)$\frac{ab}{(b-a)^2}$　(C)$\frac{2ab}{a^2+b^2}$

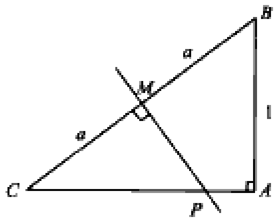
(D)$\frac{2ab}{(a+b)^2}$　(E)$\frac{ab}{(a+b)^2}$

18. $\sqrt{2+\sqrt{3}}-\sqrt{2-\sqrt{3}}$ equals

(A)2　(B)$\sqrt{2}$　(C)$\sqrt{3}$

(D)1　(E)$12^{\frac{1}{4}}$

19. In the diagram, MP is the perpendicular bisector of BC and the length of AB is 1. The length of MP is

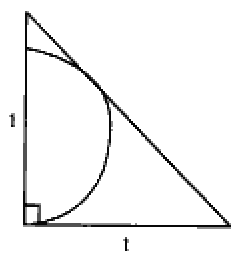


(A)$\frac{a}{\sqrt{2a^2-1}}$　(B)$a\sqrt{4a^2-1}$

(C)$\frac{a}{\sqrt{4a^2+1}}$　(D)$\frac{a}{\sqrt{4a^2-1}}$

(E)$\frac{1}{2}$

20. A semi-circle is inscribed in an isosceles right-angled triangle as shown. The radius of the semi-circle is



(A)$\frac{1}{\sqrt{2}}$　(B)$3-2\sqrt{2}$

(C)$\frac{1}{2}$　(D)$2-\sqrt{2}$

(E)$\sqrt{2}-1$

试 卷 四

Test 4

1. 两次减价分别为 10%和 20%，这相当于一次减价百分之几？

(A)30%　(B)15%　(C)72%
(D)28%　(E)上述答案都不对

2. m 和 n 为整数，$m>n$。在 m 和 n 之间有多少个整数(不包括 m、n)？

(A) $m-n$　(B) $m-n-1$
(C) $m-n+1$　(D) $m+n$
(E) $m+n-1$

3. 1 升等于 1 000 立方厘米。
一根软管 20 米长，直径为 15 毫米，问注满这根软管约需要多少升水？

(A)0.45　(B)3.5　(C)4.5
(D)35　(E)45

4. 一个正方形的周长是另一个正方形周长的 4 倍。问这两个正方形的面积比是多少？

(A)2:1　(B)4:1　(C)8:1
(D)16:1　(E)64:1

5. n 为自然数，并自定义 $n!=n\times(n-1)\times(n-2)\times\cdots\times2\times1$。例如，$4!=4\times3\times2\times1=24$。若 $6!=a!\times b!$，并且 $a>1$，$b>1$，则 $a+b$ 等于多少？

(A)8　(B)7　(C)6
(D)5　(E)4

6. 按如图所示的方法排列地砖，第 15 个图案会有多少块黑色的地砖？

1. Successive discounts of 10% and 20% are equivalent to a single discount of

(A)30%　(B)15%　(C)72%
(D)28%　(E)None of these

2. m and n are integers with $m>n$. The number of integers between (but not including) m and n, is

(A) $m-n$　(B) $m-n-1$
(C) $m-n+1$　(D) $m+n$
(E) $m+n-1$

3. Recall that 1 litre is 1 000 cubic centimetres.
A hosepipe is 20m long with an inside diameter of 15mm. The amount of water (in litres) that it takes to fill the hosepipe is closest to

(A)0.45　(B)3.5　(C)4.5
(D)35　(E)45

4. The perimeter of a square is four times the perimeter of another square. What is the ratio of their areas?

(A)2:1　(B)4:1　(C)8:1
(D)16:1　(E)64:1

5. If n is a natural number then we define $n!$ to be the product $n\times(n-1)\times(n-2)\times\cdots\times2\times1$. For example $4!=4\times3\times2\times1=24$. If $6!=a!\times b!$ where $a>1$ and $b>1$, then $a+b$ is

(A)8　(B)7　(C)6
(D)5　(E)4

6. How many black tiles will be required to build the 15th figure in the given pattern?



图1（fig.1）

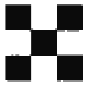


图2（fig.2）

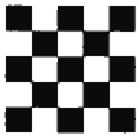
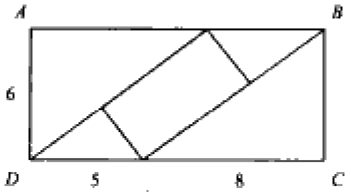


图3（fig.3）

(A)403　(B)365　(C)481
(D)421　(E)225

7. $ABCD$ 为一个长方形，问阴影长方形的面积是多少？

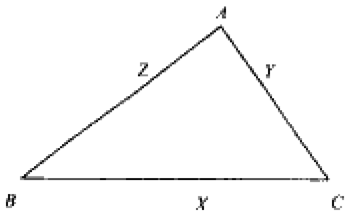


(A)10　(B)14　(C)15
(D)16　(E)18

8. 设 p 是方程 $x^6-2=0$ 的解，$(p-1)(p^{12}+p^{13}+\cdots+p^{41})$ 等于多少？
(A)124　(B)144　(C)192
(D)212　(E)252

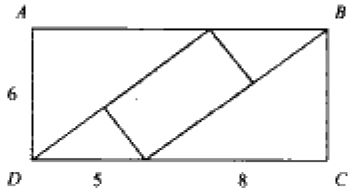
9. 若 m 和 n 为自然数，且 $\sqrt{7+\sqrt{48}}=\sqrt{m}+\sqrt{n}$，问 m^2+n^2 等于多少？
(A)25　(B)37　(C)29
(D)40　(E)41

10. 在 $\triangle ABC$ 中，$AY=AZ$，$BZ=BX$，$CX=CY$，$BC=a$，$CA=b$，$BA=c$，问 AY 的长度是多少？



(A)403　(B)365　(C)481
(D)421　(E)225

7. $ABCD$ is a rectangle. The area of the shaded rectangle is

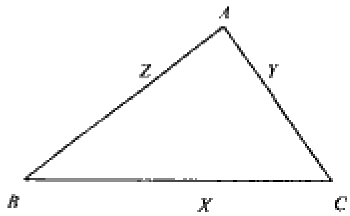


(A)10　(B)14　(C)15
(D)16　(E)18

8. Let p be a solution of the equation $x^6-2=0$. Then the value of $(p-1)(p^{12}+p^{13}+\cdots+p^{41})$ is
(A)124　(B)144　(C)192
(D)212　(E)252

9. If m and n are natural numbers such that $\sqrt{7+\sqrt{48}}=\sqrt{m}+\sqrt{n}$ then m^2+n^2 equals
(A)25　(B)37　(C)29
(D)40　(E)41

10. In $\triangle ABC$, $AY=AZ$, $BZ=BX$ and $CX=CY$. The length of BC is a, that of CA is b and BA is c. The length of AY is



(A)$\frac{1}{2}(a+c-b)$

(B)$\frac{1}{2}(a+b-c)$

(C)$\frac{1}{2}(b+c-a)$

(D)$\frac{1}{4}(2b+a-c)$

(E)$\frac{1}{4}(2b+c-a)$

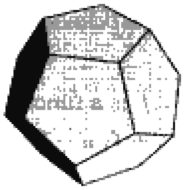
11. $ABCDEFGH$ 为一个正八边形,问$\angle HBC$ 是多少度?

(A)112.5°　(B)108°

(C)90°　(D)105°

(E)97.5°

12. 有一个正十二面体如图所示,每一面为一个正五边形。相应的面通过棱相邻并在顶角相交。问这个正十二面体一共有多少个棱和顶角?



(A)20　(B)42

(C)50　(D)60　(E)72

13. 艾格尼丝说:"比莉总是说真话。"

比莉说:"艾格尼丝在说谎。"

夏洛特说:"他们两人都在说谎。"

问谁说了真话?

(A)只有艾格尼丝

(B)只有比莉

(C)只有夏洛特

(D)比莉和夏洛特

(E)上述答案都不对

14. $6x+15y=85$ 有多少对整数解(x,y)。

(A)0　(B)1

(C)2　(D)3

(E)超过 3

(A)$\frac{1}{2}(a+c-b)$

(B)$\frac{1}{2}(a+b-c)$

(C)$\frac{1}{2}(b+c-a)$

(D)$\frac{1}{4}(2b+a-c)$

(E)$\frac{1}{4}(2b+c-a)$

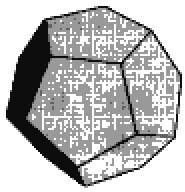
11. $ABCDEFGH$ is a regular octagon (an 8-sided figure). The angle HBC is

(A)112.5°　(B)108°

(C)90°　(D)105°

(E)97.5°

12. The dodecahedron illustrated is a regular solid with 12 faces, each of which is a regular pentagon (5-sided figure). The faces are joined along edges and meet at vertices. For this solid the number of vertices plus the number of edges is



(A)20　(B)42　(C)50

(D)60　(E)72

13. Agnes said "Billy always speaks the truth".

Billy said "Agnes is lying".

Charlotte said "Agnes and Billy are both lying".

Who is speaking the truth?

(A)Only Agnes

(B)Only Billy

(C)Only Charlotte

(D)Both Billy and Charlotte

(E)None of these.

14. The number of pairs of integers (x,y) that are solutions to the equation $6x+15y=85$ is

(A)0　(B)1

(C)2　(D)3

(E)More than 3

15. $ABCD$ 为一个梯形，$AD \parallel BC$，对角线 AC 和 BD 相交于 O 点。若 $\triangle AOD$ 的面积为 x，$\triangle BOC$ 的面积为 y，问梯形 $ABCD$ 的面积是多少？

(A)$2(x+y)$　　(B)$4\sqrt{xy}$

(C)$\frac{8xy}{x+y}$　　(D)$(\sqrt{x}+\sqrt{y})^2$

(E)上述答案都不对

15. $ABCD$ is a trapezium with AD parallel to BC. The diagonals AC and BD intersect at O. If the area of triangle AOD is x, and the area of tuiangle BOC is y then the area of the trapezium is

(A)$2(x+y)$　　(B)$4\sqrt{xy}$

(C)$\frac{8xy}{x+y}$　　(D)$(\sqrt{x}+\sqrt{y})^2$

(E)None of these

16. 若 $s=1+\frac{1}{4}+\frac{1}{9}+\frac{1}{16}+\cdots$，则 $1+\frac{1}{9}+\frac{1}{25}+\frac{1}{49}+\cdots$ 等于多少？

(A)$\frac{1}{2}s$　　(B)$\frac{3}{4}s$

(C)$s-\frac{1}{4}$　　(D)$s-\frac{1}{2}$

(E)不能确定

16. If $s=1+\frac{1}{4}+\frac{1}{9}+\frac{1}{16}+\cdots$, then $1+\frac{1}{9}+\frac{1}{25}+\frac{1}{49}+\cdots$ equals

(A)$\frac{1}{2}s$　　(B)$\frac{3}{4}s$

(C)$s-\frac{1}{4}$　　(D)$s-\frac{1}{2}$

(E)Cannot be determined

17. 函数 f 有 $f(1)=1$，$f(n)=n+f(n-1)$，且自然数 $n\geqslant 2$。计算 $f(19)$的值。

(A)171　　(B)190　　(C)210

(D)241　　(E)255

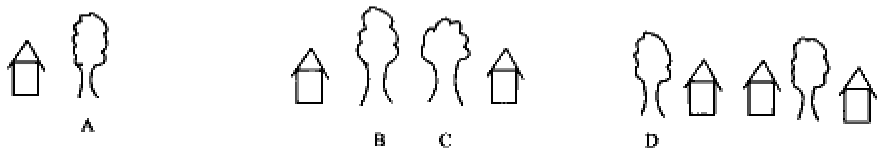
17. f is a function for which $f(1)=1$ and $f(n)=n+f(n-1)$ for each natural number $n\geqslant 2$. The value of $f(19)$ is

(A)171　　(B)190　　(C)210

(D)241　　(E)255

18. 图中所示的树和房子成一条直线，每所房子中都住有1个小孩。问这些小孩应在哪棵树下集合，才能使大家走的总距离最短？

18. The houses and trees in the diagram are all in a straight line. In each of the six houses lives a child. At which tree should the children meet so that the sum of the distances they walk to that tree is a minimum?



(A)A　　(B)B　　(C)C

(D)D　　(E)不能确定

(A)A　　(B)B　　(C)C

(D)D　　(E)impossible to determine

19. 一首曲子在第一行有7个音符：$CC\ GG\ AA\ G$。若将这7个音符任意排列，一共可编成多少首不同的曲子？

(A)5 040　　(B)210　　(C)105

(D)72　　(E)12

19. A tune has 7 notes in its first line, $CC\ GG\ AA\ G$. If the notes are rearranged at random, how many different melodies can be composed?

(A)5 040　　(B)210　　(C)105

(D)72　　(E)12

20. $P(x)$是一个多项式,多项式中变量幂的最大数为1 998。另有 $P(k)=\frac{1}{k}$, $k=1,2,\cdots,1\,999$。计算 $P(2\,000)$的值。

(A) $\frac{1}{1\,000}$ (B) $\frac{1}{999}$ (C) $\frac{1}{2\,000}$

(D) $\frac{1}{1\,999}$ (E) $\frac{1}{4\,000}$

20. $P(x)$ is a polynomial of degree 1 998 such that $P(k)=\frac{1}{k}$ for $k=1,2,\cdots,1\,999$. The value of $P(2\,000)$ is

(A) $\frac{1}{1\,000}$ (B) $\frac{1}{999}$ (C) $\frac{1}{2\,000}$

(D) $\frac{1}{1\,999}$ (E) $\frac{1}{4\,000}$

试 卷 五

Test 5

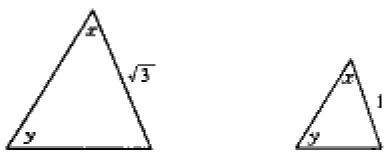
1. 三个政党竞选 100 000 张选票，且选票均有效。选票最多的政党获胜。获胜的政党至少需要多少张选票？

(A)33 333　(B)33 334　(C)50 000
(D)50 001　(E)66 667

2. 计算 $\dfrac{2^1+2^0+2^{-1}}{2^{-2}+2^{-3}+2^{-4}}$ 的值。

(A)6　(B)8　(C)$\dfrac{31}{2}$
(D)24　(E)512

3. 图中的大三角形由小三角形放大得到(即两个三角形相似)。对应边的边长如图所示，则大、小三角形的面积之比是多少？



(A)$\sqrt{3}:1$　(B)$3\sqrt{3}:1$　(C)$3:1$
(D)$\dfrac{3}{2}\sqrt{3}:1$　(E)$\dfrac{1}{2}\sqrt{3}:1$

4. 一组 20 个数的平均值为 20。这组数中 9 个数的平均值为 9，其余 11 个数的平均值是多少？

(A)20　(B)31　(C)29
(D)10　(E)11

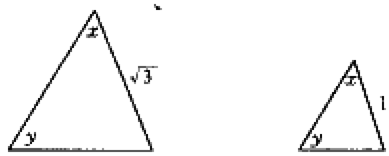
1. Three parties contest an election with 100 000 voters who all cast valid votes. The winning party is the one that obtains more votes than either of the other two parties. The smallest possible number of votes with which a party can win the election, is

(A)33 333　(B)33 334　(C)50 000
(D)50 001　(E)66 667

2. $\dfrac{2^1+2^0+2^{-1}}{2^{-2}+2^{-3}+2^{-4}}$ is equal to

(A)6　(B)8　(C)$\dfrac{31}{2}$
(D)24　(E)512

3. One of the triangles in the figure is an enlargement of the other (i. e. the triangles are similar). If the corresponding sides have lengths as shown, the ratio of the area of the large triangle to the area of the small one is

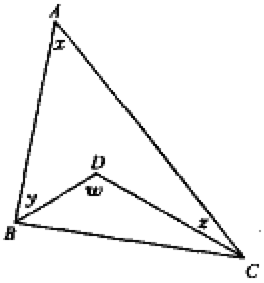


(A)$\sqrt{3}:1$　(B)$3\sqrt{3}:1$　(C)$3:1$
(D)$\dfrac{3}{2}\sqrt{3}:1$　(E)$\dfrac{1}{2}\sqrt{3}:1$

4. A given set of 20 numbers has an average of 20. Nine of these numbers have an average of 9. The average of the remaining 11 numbers is

(A)20　(B)31　(C)29
(D)10　(E)11

5. D 为 $\triangle ABC$ 中的一点，x,y,z,w 是相应角的度数。x 用 y,z 和 w 表示？



(A)$w-y-z$
(B)$w-2y-2z$
(C)$2w-y-z$
(D)$180°-w-y-z$
(E)$\frac{1}{2}w$

6. 若 $a-1=b+2=c-3=d+4$，则 a,b,c,d 中哪一个数值最大？

(A)a (B)b
(C)c (D)d
(E)不能确定

7. 计算 $100^2-99^2+98^2-97^2+\cdots-3^2+2^2-1^2$ 的值。

(A)5 050 (B)4 950
(C)5 000 (D)25 000
(E)10 100

8. 若 m 和 n 是整数，且 $2m-n=3$，则 $m-2n$ 必定为(　　)。

(A)-3 (B)0
(C)3 的倍数 (D)奇数
(E)偶数

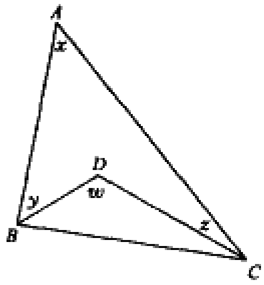
9. 若 $21\times20\times19\times\cdots\times3\times2\times1$ 能除尽 2^x，则 x 的最大值是多少？

(A)10 (B)20
(C)18 (D)12
(E)16

10. 有多少对整数(m,n)可以满足方程 $m(m+1)=2^n$？

(A)0 (B)1
(C)2 (D)3
(E)3 对以上

5. D is an interior point of triangle ABC and x,y,z and w are the measures of the angles in degrees, as shown in the figure. An expression for x in terms of y,z and w is



(A)$w-y-z$ (B)$w-2y-2z$
(C)$2w-y-z$ (D)$180°-w-y-z$
(E)$\frac{1}{2}w$

6. If $a-1=b+2=c-3=d+4$, then the largest of the four quantities a,b,c and d is

(A)a (B)b
(C)c (D)d
(E)cannot be determined

7. The value of $100^2-99^2+98^2-97^2+\cdots-3^2+2^2-1^2$ is

(A)5 050 (B)4 950
(C)5 000 (D)25 000
(E)10 100

8. If m and n are integers and $2m-n=3$, then $m-2n$ must be

(A)-3 (B)0
(C)A multiple of 3 (D)An odd integer
(E)An even integer

9. The maximum value of x such that 2^x divides $21\times20\times19\times\cdots\times3\times2\times1$ is

(A)10 (B)20
(C)18 (D)12
(E)16

10. The number of pairs of integers (m,n) which satisfy the equation $m(m+1)=2^n$ is

(A)0 (B)1
(C)2 (D)3
(E)More than 3

11. $n! = n\times(n-1)\times(n-2)\times\cdots\times3\times2\times1$，例如 $5! = 5\times4\times3\times2\times1 = 120$。$1! + 2! + 3! + 4! + \cdots + 1\,999!$ 和的个位数是几？

(A)1　(B)3　(C)5
(D)7　(E)9

12. 如图所示，一只山羊用一根 10 米长的绳子系在一所正五边形房子的一个顶角上，正五边形的边长为 6 米。山羊在正五边形区域内能吃到草的面积约为多少平方米？



(A)240　(B)100　(C)215
(D)220　(E)230

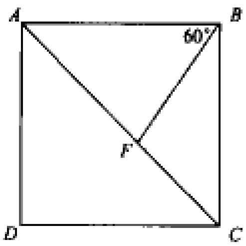
13. 用数字 7,6,5,4 和 3 可以组成多少个大于5 000 的整数（所用数字不能重复）？

(A)174　(B)144　(C)84
(D)192　(E)202

14. 定义一个"质数日期"，这一天的月份和日期除了 1 以外没有其他公因数。例如 22/5（五月 22 日）就是一个质数日期。问哪一个月的质数日期最少？

(A)二月　(B)三月　(C)十二月
(D)八月　(E)六月

15. *ABCD* 是一个边长为 2 的正方形，问 $\triangle FBC$ 的面积是多少？

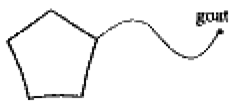


(A)$2\sqrt{3}-3$
(B)$\dfrac{\sqrt{3}+1}{4}$
(C)$\sqrt{3}-1$
(D)$2\sqrt{2}-2$
(E)$\dfrac{\sqrt{3}}{2}$

11. $n!$ is defined to be the product $n\times(n-1)\times(n-2)\times\cdots\times3\times2\times1$. For example $5! = 5\times4\times3\times2\times1 = 120$. The last digit of the sum $1! + 2! + 3! + 4! + \cdots + 1\,999!$ is

(A)1　(B)3　(C)5
(D)7　(E)9

12. A goat is tied to a 10 metre long rope which is tied to the corner of a building which is in the shape of a regular pentagon (a 5 sided figure). If each side of the pentagon is 6m then the best approximation of the area, in m^2, that the goat can graze is



(A)240　(B)100　(C)215
(D)220　(E)230

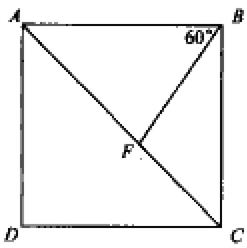
13. How many integers greater than 5 000 can be formed with the digits 7, 6, 5, 4 and 3, using each digit at most once?

(A)174　(B)144　(C)84
(D)192　(E)202

14. We define a relatively prime date to be a day for which the number of the month and the number of the day have no common factors other than 1. For example 22/5 (22 May) is such a day because 22 and 5 have no common factors other than 1. The month with the smallest number of relatively prime days is

(A)February　(B)March　(C)December
(D)August　(E)June

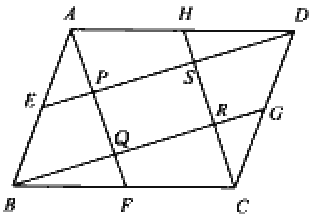
15. The square *ABCD* has sides of length 2. The area of triangle *FBC* is



(A)$2\sqrt{3}-3$
(B)$\dfrac{\sqrt{3}+1}{4}$
(C)$\sqrt{3}-1$
(D)$2\sqrt{2}-2$
(E)$\dfrac{\sqrt{3}}{2}$

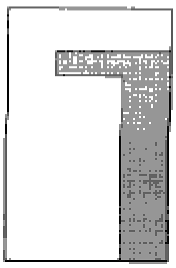
16. 派克先生在数学课上问他的 5 个学生昨天晚上是否参加了合唱练习，
佩特拉说：我们都没有参加。
彼得说：我们中有 1 人参加。
保罗说：我们中有 2 人参加。
帕特丽夏说：我们中有 3 人参加。
普莫拉说：我们中有 4 人参加。
派克知道没有参加的人说了谎，参加的人说了真话。问一共有几个人参加了合唱练习？
(A)0 (B)1 (C)2
(D)3 (E)4

17. $ABCD$ 是一个平行四边形，E、F、G 和 H 是各边的中点。问 $ABCD$ 与 $PQRS$ 的面积比是多少？



(A)3:1 (B)$3\frac{1}{2}$:1 (C)4:1
(D)$4\frac{1}{2}$:1 (E)5:1

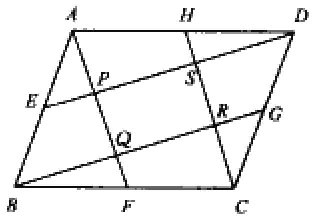
18. 如图所示，一张长方形的纸沿阴影部分剪成两张(图未按比例画)。一张有六个边，另一张有八个边。有八个边的纸的边长分别为 1,2,3,4,5,6,7,8，有六个边的纸的最大面积是多少？



(A)24 (B)27 (C)30
(D)33 (E)36

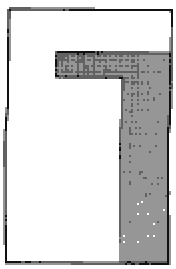
16. Mr Parker asks the 5 learners in his mathematics class how many of them attended the choir practice last night.
Petra replied: none of us attended.
Peter replied: one of us attended.
Paul replied: two of us attended.
Patricia replied: three of us attended.
Pumulla replied: four of us attended.
Mr Parker knows that the ones who did not attend lie about it and that the ones who did attend, tell the truth. How many of his mathematics learners attended the choir practice?
(A)0 (B)1 (C)2
(D)3 (E)4

17. If $ABCD$ is a parallelogram and E, F, G and H are the midpoints of the sides, then the ratio of the area of $ABCD$ to the area of $PQRS$ is



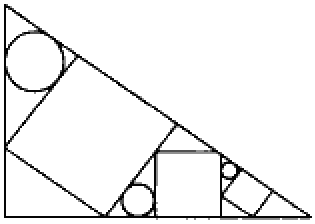
(A)3:1 (B)$3\frac{1}{2}$:1 (C)4:1
(D)$4\frac{1}{2}$:1 (E)5:1

18. A rectangular piece of paper is cut into two pieces by cutting along segments parallel to its sides as in the figure (not drawn to scale). The result is a 6 sided and an 8 sided piece of paper. The lengths of the sides of the 8 sided piece of paper are 1,2,3,4,5,6,7 and 8 units in some order. The maximum area, in square units, of the 6 sided (shaded) piece of paper is



(A)24 (B)27 (C)30
(D)33 (E)36

19. 如图所示，有三个正方形和三个圆在一个直角三角形中相切。最小圆的半径为 19，最大圆的半径为 99，问另一个圆的半径是多少？



(A) $\frac{1}{2}(19+99)$　(B) $\sqrt{19\times 99}$

(C) $\sqrt{99^2-19^2}$　(D) $(\sqrt{19}-\sqrt{99})^2$

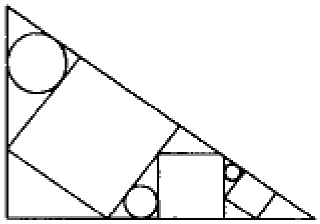
(E) $\frac{2}{\frac{1}{19}+\frac{1}{99}}$

20. 一个女孩手里握着 6 根线，一端 6 个线头露在手上面，另一端 6 个线头露在手下面。另一个女孩随意将手上面的线头两两系在一起，再把手下面的线头也两两系在一起。问这样使 6 根线成为一个线圈的概率有多大？

(A) $\frac{8}{15}$　(B) $\frac{1}{15}$　(C) $\frac{7}{15}$

(D) $\frac{1}{32}$　(E) $\frac{1}{225}$

19. The figure shows three squares and circles inscribed in a right - angled triangle. If the smallest and the largest circles have radii 19 and 99 respectively, what is the radius of the other circle?



(A) $\frac{1}{2}(19+99)$　(B) $\sqrt{19\times 99}$

(C) $\sqrt{99^2-19^2}$　(D) $(\sqrt{19}-\sqrt{99})^2$

(E) $\frac{2}{\frac{1}{19}+\frac{1}{99}}$

20. A girl holds six pieces of string in her hand with the ends of the strings sticking out above and below her hand. Another girl ties the upper ends together in pairs, and then does the same for the lower ends. If she ties the pairs in a random manner, what is the probability that all six pieces of string will form a single ring?

(A) $\frac{8}{15}$　(B) $\frac{1}{15}$　(C) $\frac{7}{15}$

(D) $\frac{1}{32}$　(E) $\frac{1}{225}$

试 卷 六

Test 6

1. $\frac{3}{\sqrt{\sqrt{24}-1}}$约等于多少?

(A)1.5 (B)0.8 (C)1.7
(D)1.3 (E)0.75

2. 一个正方形的对角线长为 d,正方形的面积是多少?

(A)$\frac{1}{2}d^2$ (B)$\frac{d^2}{\sqrt{2}}$ (C)d^2
(D)$\sqrt{2}d^2$ (E)$2d^2$

3. $\sqrt{2\ 000^{2\ 000}}$等于下列哪一项?

(A)$1\ 000^{1\ 000}$
(B)$1\ 000^{2\ 000}$
(C)$(20\sqrt{5})^{2\ 000}$
(D)$2\ 000^{20\sqrt{5}}$
(E)上述答案都不对

4. 下列哪个数值最大?

(A)333 (B)33^3 (C)$(3^3)^3$
(D)$3^{(3^3)}$ (E)3^{33}

5. 一个立方体内接于一个直径为 $9\sqrt{3}$厘米的圆球体。立方体的体积是多少立方厘米?

(A)243 (B)729 (C)$243\sqrt{3}$
(D)$9\sqrt{3}$ (E)27

6. 若对于所有的 x 值有:$\frac{3x-5}{x^2-1}=\frac{A}{x-1}+\frac{B}{x+1}$,则 A^2+B^2 等于多少?

(A)25 (B)17 (C)10
(D)18 (E)26

1. Which of the following is the closest approximation to $\frac{3}{\sqrt{\sqrt{24}-1}}$?

(A)1.5 (B)0.8 (C)1.7
(D)1.3 (E)0.75

2. The length of a diagonal of a square is d. The area of the square is

(A)$\frac{1}{2}d^2$ (B)$\frac{d^2}{\sqrt{2}}$ (C)d^2
(D)$\sqrt{2}d^2$ (E)$2d^2$

3. $\sqrt{2\ 000^{2\ 000}}$ is the same as

(A)$1\ 000^{1\ 000}$
(B)$1\ 000^{2\ 000}$
(C)$(20\sqrt{5})^{2\ 000}$
(D)$2\ 000^{20\sqrt{5}}$
(E)None of these

4. Which one of the following numbers is the largest?

(A)333 (B)33^3 (C)$(3^3)^3$
(D)$3^{(3^3)}$ (E)3^{33}

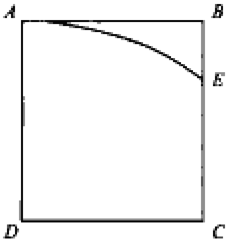
5. A cube is inscribed in a sphere of diameter $9\sqrt{3}$ cm. The volume of the cube in cm^3 is

(A)243 (B)729 (C)$243\sqrt{3}$
(D)$9\sqrt{3}$ (E)27

6. If $\frac{3x-5}{x^2-1}=\frac{A}{x-1}+\frac{B}{x+1}$ is true for all possible values of x, then the value of A^2+B^2 is

(A)25 (B)17 (C)10
(D)18 (E)26

7. $ABCD$ 为长方形，$AD=\sqrt{2}$，$AB=1$。AE 是以 D 为圆心的一段圆弧。CE 的长度是多少？



(A)$2\sqrt{2}-2$　　(B)$\frac{1}{\sqrt{2}}$

(C)$\frac{4-\sqrt{2}}{2}$　　(D)$\frac{1}{2(\sqrt{2}-1)}$

(E)1

8. 序列 $ABCDEDCBAABCDEDCBAABCDEDCBAABC\cdots$ 的第 2 000 项是哪一个字母？

(A)A　　(B)B　　(C)C

(D)D　　(E)E

9. $5=2+3$ 表明一些质数可以表示为另两个质数的和。问有多少个质数可以用两种不同的方法表示为两个质数的和？($2+3$ 和 $3+2$ 视为相同)

(A)0 个　　(B)1 个　　(C)2 个

(D)3 个　　(E)3 个以上

10. 一个六边形最多有几个锐角？

(A)2　　(B)3　　(C)4

(D)5　　(E)6

11. 有多少个自然数 n 可以满足 $\frac{5}{9}<\frac{n}{n+16}<\frac{4}{7}$？

(A)2　　(B)3　　(C)0

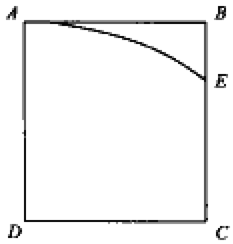
(D)1　　(E)3 个以上

12. 若 n 为任意自然数，问 n^2 除以 7 会有多少个不同的余数？

(A)2　　(B)3　　(C)4

(D)5　　(E)6

7. $ABCD$ is a rectangle with $AD=\sqrt{2}$ and $AB=1$. AE is an arc of a circle with centre D. The length of CE is



(A)$2\sqrt{2}-2$　　(B)$\frac{1}{\sqrt{2}}$

(C)$\frac{4-\sqrt{2}}{2}$　　(D)$\frac{1}{2(\sqrt{2}-1)}$

(E)1

8. The 2 000th letter in the sequence $ABCDEDCBAABCDEDCBAABCDEDCBAABC\cdots$ is

(A)A　　(B)B　　(C)C

(D)D　　(E)E

9. The fact that $5=2+3$ shows that some prime numbers can be written as the sum of two other prime numbers. How many prime numbers can be written as the sum of two prime numbers in two different ways? ($2+3$ and $3+2$ are not considered different)

(A)0　　(B)1　　(C)2

(D)3　　(E)More than 3

10. The largest number of acute angles that a convex hexagon can have, is

(A)2　　(B)3　　(C)4

(D)5　　(E)6

11. The number of different natural numbers n such that $\frac{5}{9}<\frac{n}{n+16}<\frac{4}{7}$, is

(A)2　　(B)3　　(C)0

(D)1　　(E)More than 3

12. If n can be any natural number, how many different values for the remainder can you get if you divide n^2 by 7?

(A)2　　(B)3　　(C)4

(D)5　　(E)6

13. 一个多项式除以 $x-1$,余数为 2,除以 $x-2$,余数为 1。若这个多项式除以 $(x-1)(x-2)$,余数是多少?

(A)2　(B)x　(C)$x+1$
(D)3　(E)$-x+3$

13. An unknown polynomial yields a remainder of 2 upon division by $x-1$, and a remainder of 1 upon division by $x-2$. If this polynomial is divided by $(x-1)(x-2)$, then the remainder is

(A)2　(B)x　(C)$x+1$
(D)3　(E)$-x+3$

14. 一个农夫养了一些羊和鸡,平均每只动物有 l 条腿。羊的个数与鸡的个数之比是多少?

(A)$\frac{l}{3(4-l)}$　(B)$\frac{l-2}{4-l}$
(C)$\frac{3(l-2)}{l}$　(D)$\frac{(l-2)^2}{16-l^2}$
(E)$\frac{7(l^2-4)}{5(16-l^2)}$

14. A farmer has both sheep and chickens. The average number of legs per animal is l. The ratio of the number of sheep to the number of chickens is

(A)$\frac{l}{3(4-l)}$　(B)$\frac{l-2}{4-l}$
(C)$\frac{3(l-2)}{l}$　(D)$\frac{(l-2)^2}{16-l^2}$
(E)$\frac{7(l^2-4)}{5(16-l^2)}$

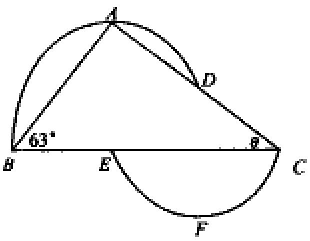
15. 一本 12 页的书需要用 15 个数字 1,2,3,4,5,6,7,8,9,1,0,1,1,1,2 来标注页码。问下列哪一个数不可能是标注任意一本书页码的数字的个数?

(A)31　(B)543　(C)1 998
(D)1 999　(E)2 001

15. A book with 12 pages needs the 15 digits 1,2,3,4,5,6,7,8,9,1,0,1,1,1,2 in order to number all the pages. Which one of the following numbers cannot be the number of digits needed in order to number all the pages of a book?

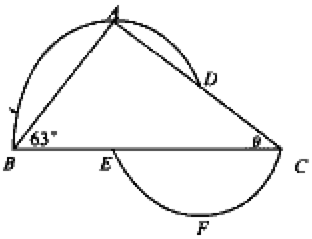
(A)31　(B)543　(C)1 998
(D)1 999　(E)2 001

16. 图中 E 点是通过 D、A、B 点的圆的圆心,D 点是通过 E、F、C 点的圆的圆心。$\angle\theta$ 角有多少度?



(A)18°　(B)20°　(C)22°
(D)24°　(E)14°

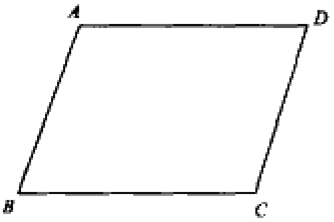
16. In the figure E is the centre of the circle through D, A and B, and D is the centre of the circle through E, F and C. The size of the angle θ is



(A)18°　(B)20°　(C)22°
(D)24°　(E)14°

17. $ABCD$ 为平行四边形,A 点和 B 是固定的,但 C 点和 D 点是可以移动的。若平行四边形各边的长不变,当 C 点和 D 点移动时,两条对角线交点的运动轨迹是什么?

17. $ABCD$ is a parallelogram with vertices A and B fixed, but vertices C and D are movable. If the lengths of all the sides are fixed, then the path of the intersection of the diagonals, as C and D move, is a



(A)圆　　(B)部分抛物线

(C)菱形　　(D)直线段

(E)部分双曲线

18. 有多少对正整数(m,n)满足方程$\frac{1}{m}+\frac{1}{n}=\frac{1}{15}$?

(A)10　　(B)2　　(C)4

(D)8　　(E)9

19. 一个办公室有30名雇员。有5名雇员讲西班牙语、法语和英语,有9名雇员讲西班牙语和英语,有20名雇员讲法语,其中有12名雇员还讲西班牙语,有18名雇员讲英语,没有人只讲西班牙语。问有多少雇员只讲英语?

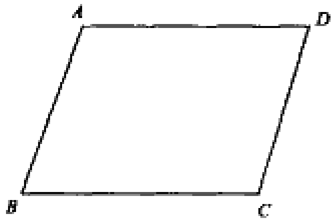
(A)5　　(B)6　　(C)7

(D)8　　(E)9

20. 设$2u+v+w+x+y+z=3$,问这个方程有多少个非负的整数解(u,v,w,x,y,z)?

(A)27　　(B)25　　(C)30

(D)40　　(E)35



(A)circle　　(B)part of a parabola

(C)rhombus　　(D)straight line segment

(E)part of a hyperbola

18. The number of ordered pairs of positive integers (m,n), such that $\frac{1}{m}+\frac{1}{n}=\frac{1}{15}$, is

(A)10　　(B)2　　(C)4

(D)8　　(E)9

19. An office employs thirty people. Five of them speak Spanish, French and English. Nine speak Spanish and English, twenty speak French of which twelve also speak Spanish. Eighteen speak English. No one speaks only Spanish. How many employee speak only English?

(A)5　　(B)6　　(C)7

(D)8　　(E)9

20. Consider the equation $2u+v+w+x+y+z=3$. How many solutions (u,v,w,x,y,z) of non-negative integers does this equation have?

(A)27　　(B)25　　(C)30

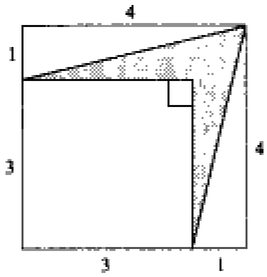
(D)40　　(E)35

试 卷 七

Test 7

1. 计算正方形中阴影部分的面积。

(A)1 (B)3
(C)4 (D)5
(E)2



2. 一只猎鹰用了三周的时间从欧洲飞到美国，它平均每小时飞行多少千米？

(A)20 (B)2 (C)200
(D)100 (E)400

3. 一个男孩的兄弟和他的姐妹一样多，每一个姐妹的兄弟比她的姐妹多一倍。问这一家一共有多少个孩子？

(A)3 (B)4 (C)5
(D)6 (E)7

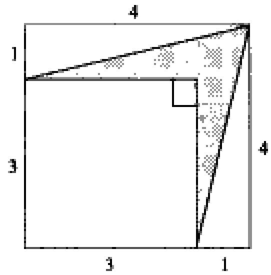
4. 若 x 为 y 的 $x\%$，y 为 z 的 $y\%$，x 为一个正实数，问 z 等于多少？

(A)100 (B)200
(C)10 000 (D)不存在
(E)不能确定

5. 下面各图显示的是边长为 1 的正方形中内接有一些圆。问哪个图形中圆的总面积最大？

1. The area of the shaded region in the square is

(A)1 (B)3
(C)4 (D)5
(E)2



2. A falcon migrated from Europe to America in three weeks. Its average speed in km/h was approximately

(A)20 (B)2 (C)200
(D)100 (E)400

3. A boy has as many sisters as he has brothers. Each of his sisters has twice as many brothers as she has sisters. How many children are there in the family?

(A)3 (B)4 (C)5
(D)6 (E)7

4. If x is $x\%$ of y and y is $y\%$ of z, where x is a positive real number, what is the value of z?

(A)100 (B)200
(C)10 000 (D)It does not exist
(E)It cannot be determined

5. Each of the figures below shows a square of side 1 with inscribed circles. In which of the figures do the circles have the greatest total area?

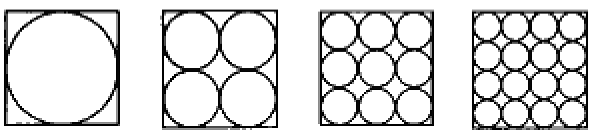


图 1(fig.1) 图 2(fig.2) 图 3(fig.3) 图 4(fig.4)

(A)图 1　　(B)图 2
(C)图 3　　(D)图 4
(E)它们的面积都相等

6. 问由下列各组数为边长组成的三角形中哪一个的面积最大?
(A)5,12,12　　(B)5,12,11
(C)5,12,14　　(D)5,12,15
(E)5,12,13

7. 在一个数的两端各放上一个"2",它的值增加了 2 317。原来这个数的各位数字之和是多少?
(A)9　　(B)8
(C)7　　(D)6
(E)5

8. 在 1,2,3,…,2 001 之间有多少个数既是完全平方又是完全立方?
(A)3 个　　(B)1 个
(C)4 个　　(D)4 个以上
(E)2 个

9. 掷两个正方形骰子(注:骰子各面上的数为 1 至 6),得到的两个数字之和是质数的概率是多少?
(A)$\frac{5}{36}$　　(B)$\frac{1}{6}$　　(C)$\frac{5}{12}$
(D)$\frac{1}{2}$　　(E)$\frac{2}{9}$

10. 若 $f(x)=x^{2\,001}(x-1)^{2\,001}$,则 $f(9)-f(3)f(4)$等于多少?
(A)9　　(B)0　　(C)3
(D)4　　(E)2

11. 24 的除数的和为 60,24 的除数的倒数的和是多少?
(A)$\frac{5}{2}$　　(B)$\frac{5}{4}$　　(C)$\frac{1}{60}$
(D)2　　(E)$\frac{8}{3}$

(A)Figure 1　　(B)Figure 2
(C)Figure 3　　(D)Figure 4
(E)They all have the same area

6. Of the following triangles given by the lengths of their sides, which one has the greatest area?
(A)5,12,12　　(B)5,12,11
(C)5,12,14　　(D)5,12,15
(E)5,12,13

7. By placing a 2 at both ends of a number, its value is increased by 2 317. The sum of the digits of the original number is
(A)9　　(B)8
(C)7　　(D)6
(E)5

8. How many numbers in the list 1,2,3,…,2 001 are perfect squares and also perfect cubes of whole numbers?
(A)Three　　(B)One
(C)Four　　(D)More than four
(E)Two

9. If two regular six-sided dice are thrown, the probability that the sum will be a prime number is
(A)$\frac{5}{36}$　　(B)$\frac{1}{6}$　　(C)$\frac{5}{12}$
(D)$\frac{1}{2}$　　(E)$\frac{2}{9}$

10. If $f(x)=x^{2\,001}(x-1)^{2\,001}$, then $f(9)-f(3)f(4)$ equals
(A)9　　(B)0　　(C)3
(D)4　　(E)2

11. The sum of the divisors of 24 is 60. The sum of the reciprocals of the divisors of 24 is
(A)$\frac{5}{2}$　　(B)$\frac{5}{4}$　　(C)$\frac{1}{60}$
(D)2　　(E)$\frac{8}{3}$

12. 若 x 和 y 都为正实数，且 $x=3+\cfrac{1}{3+\cfrac{1}{x}}$，$y=3+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{y}}}$，则 $x-y$ 等于多少？

(A)3　(B)$3+\frac{1}{y}$　(C)$\cfrac{1}{3+\cfrac{1}{y}}$

(D)0　(E)不能确定

13. 若 $n+1=2\,000^2+2\,001^2$，则 $\sqrt{2n+1}$ 等于多少？

(A)$3\,000\sqrt{2}$　(B)3 999

(C)4 001　(D)$\sqrt{4\,000^2+1}$

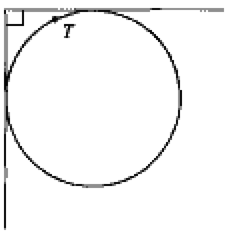
(E)$\sqrt{4\,000^2+3}$

14. 数列前 p 项的和为 $p(p+1)(p+2)$，该数列的第 10 项是多少？

(A)1 320　(B)396　(C)600

(D)114　(E)330

15. 如图所示，一个圆与两条相互垂直的直线相切。圆上 T 点与一条直线的距离为 8 厘米，与另一条直线的距离为 9 厘米。圆的半径是多少厘米？



(A)5　(B)17　(C)39

(D)35　(E)29

16. 一个数列为 1,2,3,…,500，去掉这个数列中的一些数，使得新形成的数列中的任何两个数相加都不会是 7 的倍数，问这个新形成的数列最多有多少项？

(A)213　(B)217　(C)216

(D)284　(E)287

12. If

$$x=3+\cfrac{1}{3+\cfrac{1}{x}} \text{ and } y=3+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{y}}}$$

where x and y are positive real numbers, then $x-y$ equals

(A)3　(B)$3+\frac{1}{y}$　(C)$\cfrac{1}{3+\cfrac{1}{y}}$

(D)0　(E)Cannot be determined

13. If $n+1=2\,000^2+2\,001^2$ then $\sqrt{2n+1}$ equals

(A)$3\,000\sqrt{2}$　(B)3 999

(C)4 001　(D)$\sqrt{4\,000^2+1}$

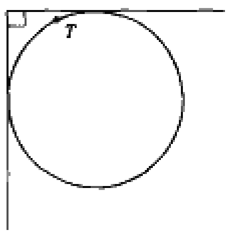
(E)$\sqrt{4\,000^2+3}$

14. The sum of the first p terms of a sequence of numbers is $p(p+1)(p+2)$. The 10th term of the sequence is

(A)1 320　(B)396　(C)600

(D)114　(E)330

15. A circle touches two lines perpendicular to each other as shown in the diagram. Point T is 8 cm from one line and 9 cm from the other. The radius of the circle, in cm, is



(A)5　(B)17　(C)39

(D)35　(E)29

16. Starting with the numbers 1,2,3,…,500, a new sequence is formed by deleting numbers so that the sum of any two numbers of the new sequence is never a multiple of seven. What is the maximum length of the new sequence?

(A)213　(B)217　(C)216

(D)284　(E)287

17. 将整数 1 至 2 001 按顺序沿一个圆的圆周排列。从 1 开始，每逢第 6 个数字将其标出（即 1，7，13，19，等）。按照这一方法直到出现已标出的数字为止。问这时还有多少个数没有被标出？

(A)0　(B)1 668　(C)1 669
(D)1 004　(E)1 334

18. 设 n 为一个不变的正整数。若 x 为正实数，且

$$x^n+x^{n-2}+x^{n-4}+\cdots+\frac{1}{x^{n-4}}+\frac{1}{x^{n-2}}+\frac{1}{x^n}\geqslant A$$

问 A 的最大值是多少？

(A)n^2　(B)$n+1$　(C)0
(D)$n(n+1)$　(E)$n^2(n+1)$

19. 下列哪个数可以表示为 6 个奇数的平方和？

(A)1 998　(B)1 996　(C)2 000
(D)2 004　(E)2 002

20. 最近这段时期中有 11 天下雨。上午下雨，下午就是晴天；下午下雨，这天上午也会是晴天。这段时期一共有 9 个上午和 12 个下午是晴天。问这段时期中共有多少天没有下雨？

(A)6　(B)4　(C)3
(D)5　(E)7

17. The integers from 1 to 2 001 are written in order around a circle. Starting at 1, every 6th number is marked(that is 1,7,13,19,etc.). This process is continued until a number is reached that has already been marked. How many unmarked numbers remain?

(A)0　(B)1 668　(C)1 669
(D)1 004　(E)1 334

18. Let n be a fixed positive integer. The maximum value of A such that

$$x^n+x^{n-2}+x^{n-4}+\cdots+\frac{1}{x^{n-4}}+\frac{1}{x^{n-2}}+\frac{1}{x^n}\geqslant A$$

for all positive real numbers x, is

(A)n^2　(B)$n+1$　(C)0
(D)$n(n+1)$　(E)$n^2(n+1)$

19. Which one of the numbers below can be expressed as the sum of the squares of 6 odd integers?

(A)1 998　(B)1 996　(C)2 000
(D)2 004　(E)2 002

20. During a recent period of time, eleven days had some rain. A morning rain was always followed by a clear afternoon. An afternoon rain was always preceded by a clear morning. A total of nine mornings and twelve afternoons were clear. How many days had no rain at all?

(A)Six　(B)Four　(C)Three
(D)Five　(E)Seven

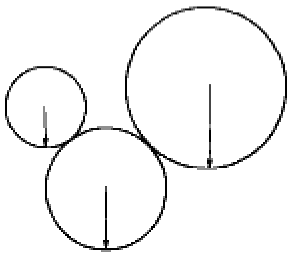
试 卷 八

Test 8

1. 1 000 立方厘米的水重 1 千克。一次在一块长为 100 米宽为 50 米的长方形球场上的降雨量为 10 毫米,问这些雨水有多重?
(A)0.5 吨　(B)5 千克　(C)50 吨
(D)50 千克　(E)5 吨

2. 将一个正数的小数点向右移动 4 位,则新形成的数是原来这个数的倒数的 9 倍。原来这个正数是多少?
(A)0.000 3　(B)0.003　(C)0.03
(D)0.3　(E)3

3. 如图所示,有 3 个轮子相切,它们的半径分别为 6 厘米、15 厘米和 20 厘米。若在轮子间没有打滑,在 3 个箭头再一次同时指向下方时,小轮子要转多少圈?



(A)12　(B)20　(C)6
(D)15　(E)10

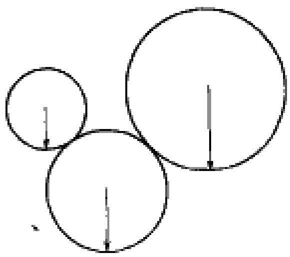
4. 将$(a+b+c+d+e)(c+d+e+f+g)$完全展开后一共有多少项?
(A)18　(B)22　(C)21
(D)24　(E)25

5. 计算 $2\,002^2-2\,001^2+2\,000^2-1\,999^2+\cdots+2^2-1^2$ 的值。

1. Remember that 1 000 cm^3 of water weighs 1 kg. During a rain shower, 10 mm of rain fell on a rectangular soccer field with dimensions 100 m by 50 m. The mass of rain that fell on the field was
(A)0.5 ton　(B)5 kg　(C)50 ton
(D)50 kg　(E)5 ton

2. When the decimal point of a certain positive number is moved four places to the right, the new number is nine times the reciprocal of the original number. The original number was
(A)0.000 3　(B)0.003　(C)0.03
(D)0.3　(E)3

3. Three wheels touch as shown. Their radii are 6 cm, 15 cm and 20 cm. If there is no ship between the wheels, how many times will the smallest wheel turn before all the arrows point down again?



(A)12　(B)20　(C)6
(D)15　(E)10

4. How many terms are there in the simplified expansion of $(a+b+c+d+e)(c+d+e+f+g)$?
(A)18　(B)22　(C)21
(D)24　(E)25

5. $2\,002^2-2\,001^2+2\,000^2-1\,999^2+\cdots+2^2-1^2$ equals

(A)2 100 000　(B)2 000 000　(C)2 500 000
(D)2 600 003　(E)2 005 003

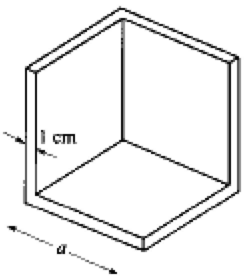
6. x 和 y 为任意正实数，且函数 f 满足 $f(xy)=\frac{f(x)}{y}$。若 $f(30)-20$，则 $f(40)$ 等于多少？

(A)40　(B)20　(C)60
(D)15　(E)30

7. 当 $r=0,1,2,3,4$ 时，$2^{2^r}+1$ 为质数，但当 $r=5$ 时，$2^{2^r}+1$ 则不是质数。$2^{32}-1$ 有多少个质数因子？

(A)1　(B)6　(C)3
(D)5　(E)6 个以上

8. 图中有一个切开的 1 厘米厚的钢制立方体。若立方体的容积为 1 801 立方厘米，则立方体的外边长 a 是多少厘米？

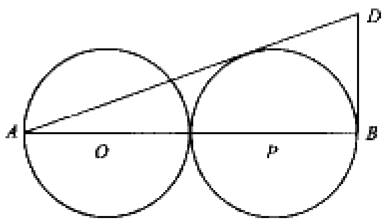


(A)24　(B)25
(C)20　(D)28
(E)31

9. 若 m 和 n 为正整数且 $m^2+2n=n^2+2m+5$，则 n 的值是多少？

(A)4　(B)3　(C)1
(D)不是唯一的　(E)不能确定

10. 如图所示，两个半径均为 2 的圆相切，圆心分别为 O 点和 P 点。若 AD 和 BD 均为圆 P 的切线，则 BD 有多长？



(A)2 100 000　(B)2 000 000　(C)2 500 000
(D)2 600 003　(E)2 005 003

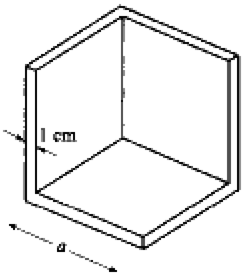
6. Let f be a function satisfying $f(xy)=\frac{f(x)}{y}$ for all positive real numbers x and y. If $f(30)=20$, then the value of $f(40)$ is

(A)40　(B)20　(C)60
(D)15　(E)30

7. It is known that $2^{2^r}+1$ is prime for $r=0,1,2,3$ and 4, but not for $r=5$. The number of prime factors of $2^{32}-1$ is

(A)1　(B)6　(C)3
(D)5　(E)More than 6

8. The cut-out cube shown in the figure is made of steel, 1 cm thick. If its volume is 1 801 cm^3, then the value of the outside length a, in cm, is

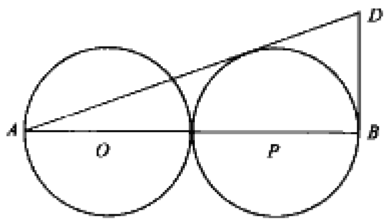


(A)24　(B)25
(C)20　(D)28
(E)31

9. If m and n are positive integers such that $m^2+2n=n^2+2m+5$, then the value of n is

(A)4　(B)3　(C)1
(D)Not unique　(E)Impossible to determine

10. Two circles of radius 2 and centres O and P touch each other as shown in the figure. If AD and BD are tangents, then the length of BD is



(A)$2\sqrt{2}$　　(B)$\sqrt{2}$　　(C)$\frac{\sqrt{2}}{2}$

(D)$2\sqrt{3}$　　(E)$\frac{2\sqrt{2}}{3}$

11. 一家公司进行有奖销售，即每盒麦片中都有一个1至1 000中的数字，连续20天每天晚上从1至1 000中抽出一个幸运数字。有一位顾客买了许多盒麦片，并且已经有500个不同的数字，但这些数学均没有被抽到。发生这种情况的概率大约是多少？

(A)$\frac{1}{100}$　　(B)$\frac{1}{100\,000}$　　(C)$\frac{1}{10}$

(D)$\frac{1}{1\,000\,000}$　　(E)$\frac{1}{1\,000}$

12. 有三个正整数，将其中两个正整数的平均值与第三个正整数相加。这样有三种不同的方法，得到的结果分别是23，31和32。问下列哪个数是原来三个正整数中的一个？

(A)21　　(B)23　　(C)28

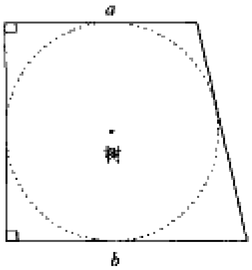
(D)5　　(E)25

13. 序列 $t_1, t_2, t_3, \cdots$ 由下列等式确定：$t_1 = 1, t_n = \frac{t_{n-1}+2}{t_{n-1}+1}$，且 $n = 2, 3, \cdots$。当 n 变得愈来愈大时，t_n 趋近于下列哪个值？

(A)$\frac{13}{2+\sqrt{5}}$　　(B)$\sqrt{2}$　　(C)$\frac{14}{3+2\sqrt{2}}$

(D)$\frac{3}{2}$　　(E)$\frac{4}{1+\sqrt{3}}$

14. 如图所示，一座花园为四边形，并且有两个角为90°，两个平行边的长度分别为 a 和 b。若花园中间有一棵树，这棵树到花园4个边的距离均相等，则花园的面积有多大？



(A)$2\sqrt{2}$　　(B)$\sqrt{2}$　　(C)$\frac{\sqrt{2}}{2}$

(D)$2\sqrt{3}$　　(E)$\frac{2\sqrt{2}}{3}$

11. A company ran a contest in which every box of cereal contained a number between 1 and 1 000 (inclusive). One lucky number was drawn from all 1 000 numbers each night for 20 nights. One man bought so much cereal that he had 500 different numbers, but not one of his numbers was lucky in any one of the draws. The probability of this happening in a fair contest is approximately

(A) 1 in 100　　(B) 1 in 100 000

(C) 1 in 10　　(D) 1 in 1 000 000

(E) 1 in 1 000

12. Three positive integers are given. Two of these are selected, their average is calculated and the result added to the third integer. This can be done in three different ways and the numbers 23, 31 and 32 are obtained. One of the original integers was

(A)21　　(B)23　　(C)28

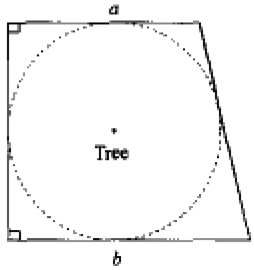
(D)5　　(E)25

13. A sequence of numbers, $t_1, t_2, t_3, \cdots$, is defined by the formulas, $t_1 = 1$ and $t_n = \frac{t_{n-1}+2}{t_{n-1}+1}$ for $n = 2, 3, \cdots$ As n gets larger and larger, t_n approaches

(A)$\frac{13}{2+\sqrt{5}}$　　(B)$\sqrt{2}$　　(C)$\frac{14}{3+2\sqrt{2}}$

(D)$\frac{3}{2}$　　(E)$\frac{4}{1+\sqrt{3}}$

14. A garden is in the shape of a quadrilateral with two adjacent right angles as shown. The lengths of the two parallel sides are a and b. If there is a tree in the garden the same distance from all four sides, then the area of the garden is



(A)$\frac{(a^2+b^2)}{2}$ (B)a^2-ab+b^2 (C)$\frac{(a+b)^2}{4}$

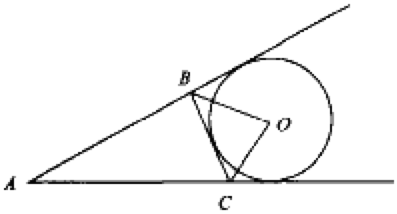
(D)ab (E)$\frac{(a^2+ab+b^2)}{3}$

15. 若 $s=1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\cdots$,则 $1-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdots$等于多少?

(A)$\frac{1}{4}-s$ (B)$\frac{s}{2}$ (C)$\frac{s}{2}-2$

(D)$\frac{s-1}{2}$ (E)$s-\frac{1}{2}$

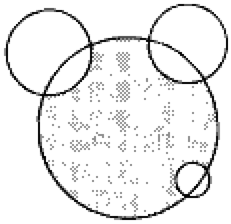
16. 图中$\triangle ABC$ 由圆心为O 的圆的三条切线构成。若$\angle BAC=30°$,则$\angle BOC$ 等于多少度?



(A)55° (B)60° (C)65°

(D)70° (E)75°

17. 图中所示的 4 个圆的直径分别为 6,4,4,2。若 v 是大圆中阴影部分的面积,w 是 3 个小圆中阴影部分的总面积,问下列哪一项正确?



(A)$2v=w$

(B)$3v=w$ (C)$v=w$

(D)$2v=3w$ (E)$v=2w$

18. 一个多边形有 n 条边,边长均为 s。若多边形的面积为 A,问从多边形内任一点到各边(如有必要可延长)的最短距离之和是多少?

(A)$\frac{ns}{2}$ (B)$\frac{A}{ns}$ (C)$\frac{nA}{s}$

(D)$\frac{2A}{ns}$ (E)$\frac{2A}{s}$

(A)$\frac{(a^2+b^2)}{2}$ (B)a^2-ab+b^2 (C)$\frac{(a+b)^2}{4}$

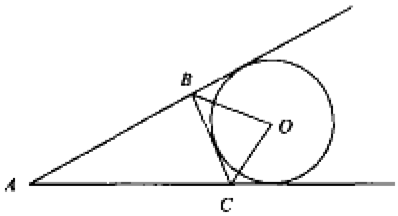
(D)ab (E)$\frac{(a^2+ab+b^2)}{3}$

15. If $s=1+\frac{1}{2^2}+\frac{1}{3^2}+\frac{1}{4^2}+\cdots$, then $1-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdots$ equals

(A)$\frac{1}{4}-s$ (B)$\frac{s}{2}$ (C)$\frac{s}{2}-2$

(D)$\frac{s-1}{2}$ (E)$s-\frac{1}{2}$

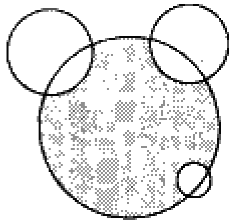
16. In the figure triangle ABC is formed by three tangents to the circle with center O. If $\angle BAC=30°$, then $\angle BOC$ equals



(A)55° (B)60° (C)65°

(D)70° (E)75°

17. The diameters of the four circles shown in the figure are 6, 4, 4 and 2. If v is the area of the shaded region inside the biggest circle and w is the total shaded area of the three smaller circles, then



(A)$2v=w$ (B)$3v=w$ (C)$v=w$

(D)$2v=3w$ (E)$v=2w$

18. A polygon has n sides all of equal length s. If the area of the polygon is A, then the sum of the shortest distances from any point inside the polygon to each of the sides (produced if necessary) is

(A)$\frac{ns}{2}$ (B)$\frac{A}{ns}$ (C)$\frac{nA}{s}$

(D)$\frac{2A}{ns}$ (E)$\frac{2A}{s}$

19. 帕斯卡三角形如下：

$$\begin{array}{ccccccccc} & & & & 1 & & & & \\ & & & 1 & & 1 & & & \\ & & 1 & & 2 & & 1 & & \\ & 1 & & 3 & & 3 & & 1 & \\ 1 & & 4 & & 6 & & 4 & & 1 \\ \vdots & & \vdots & & \vdots & & \vdots & & \vdots \end{array}$$

问前 121 个数的和是多少？

(A)$2^{16}-1$　(B)7 381　(C)$2^{15}+15$

(D)8 641　(E)2^{15}

19. The sum of the first 121 numbers in Pascal's triangle

$$\begin{array}{ccccccccc} & & & & 1 & & & & \\ & & & 1 & & 1 & & & \\ & & 1 & & 2 & & 1 & & \\ & 1 & & 3 & & 3 & & 1 & \\ 1 & & 4 & & 6 & & 4 & & 1 \\ \vdots & & \vdots & & \vdots & & \vdots & & \vdots \end{array}$$

is

(A)$2^{16}-1$　(B)7 381　(C)$2^{15}+15$

(D)8 641　(E)2^{15}

20. 艾利丝和鲍勃在玩一种游戏，即每个人从标有数字 0,1,2,…,9 的十张牌中取出一张，然后再放回去。设艾利丝取出的牌为 A，鲍勃取出的牌为 B。

若 $A>B$，则鲍勃给艾利丝 $A\times B$ 分钱。

若 $B>A$，则艾利丝给鲍勃 $A\times B$ 分钱。

若 $A=B$，且为奇数，则鲍勃给艾利丝 $A\times B$ 分钱。

若 $A=B$，且为偶数，则艾利丝给鲍勃 $A\times B$ 分钱。

许多轮游戏之后，各轮的平均结果是下列哪一项？

(A)艾利丝赢了 1 元钱

(B)鲍勃赢了 1 元钱

(C)没有人赢钱

(D)艾利丝赢了 0.45 元钱

(E)鲍勃赢了 0.45 元钱

20. Alice and Bob play a game in which each player draws a card from a pack of ten cards, numbered 0, 1, 2, …, 9 and then replaces it in the pack. Suppose Alice draws card A and Bob draws card B.

If $A>B$, then Bob pays Alice $A\times B$ cents.

If $B>A$, then Alice pays Bob $A\times B$ cents.

If $A=B$ and odd, then Bob pays Alice $A\times B$ cents.

If $A=B$ and even, then Alice pays Bob $A\times B$ cents.

Over a large number of games, the average result per game is

(A)Alice wins \$1.00

(B)Bob wins \$1.00

(C)Neither player wins anything

(D)Alice wins \$0.45

(E)Bob wins \$0.45

试 卷 九

Test 9

1. 问$\sqrt{2\,003}$约等于多少?
   (A)39　(B)41　(C)45
   (D)43　(E)47

2. 下列哪一项是奇数?
   (A)$2\,001^2+3$　(B)$2\,002^3+10$　(C)$2\,003^2+7$
   (D)$2\,004^3+1$　(E)$2\,005^2+9$

3. 克里斯有一些尺寸为 $1\times2\times6$ 的长方块。最少需要用多少这种长方块才能组成一个正方体?
   (A)6　(B)12　(C)24
   (D)18　(E)36

4. 一张黑白照片有 80%为黑色、20%为白色。若将照片放大 3 倍,则照片中的白色为百分之几?
   (A)20%　(B)180%　(C)60%
   (D)80%　(E)30%

5. 一个计算器显示 [5.123456789 [20]] 来表示数 5.123456789×10^{20}。若将这个数再加上 30,则计算器会显示下列哪一个值?
   (A)[5.123456819 [20]]　(B)[5.123456789 [20]]
   (C)[5.123456789 [50]]　(D)[35.12345679 [20]]
   (E)上述答案都不对

6. 一家超市内商品的价格总是几美元加 99 分,若一个顾客花了 41.71 美元,则这个顾客买了多少件商品?
   (A)29　(B)30　(C)71
   (D)9　(E)不能确定

1. $\sqrt{2\,003}$ is approximately
   (A)39　(B)41　(C)45
   (D)43　(E)47

2. Which one of the following is an odd number?
   (A)$2\,001^2+3$　(B)$2\,002^3+10$　(C)$2\,003^2+7$
   (D)$2\,004^3+1$　(E)$2\,005^2+9$

3. Chris has a number of blocks of size $1\times2\times6$. The smallest number of blocks he needs in order to build a solid cube is
   (A)6　(B)12　(C)24
   (D)18　(E)36

4. A black and white photograph is 80% black and 20% white. If it is enlarged three times, then the percentage of white in the enlargement is
   (A)20%　(B)180%　(C)60%
   (D)80%　(E)30%

5. A calculator displays [5.123456789 [20]] to represent the number 5.123456789×10^{20}. If 30 is added to the number, then the calculator displays
   (A)[5.123456819 [20]]　(B)[5.123456789 [20]]
   (C)[5.123456789 [50]]　(D)[35.12345679 [20]]
   (E)None of the above

6. In a supermarket items are always priced at so many dollars and 99 cents. If a shopper pays a total of $41.71, then the number of items bought, is
   (A)29　(B)30　(C)71
   (D)9　(E)impossible to determine

7. 若字母的个数应与正确答案的排序相同，则下列哪个答案是正确的？

(A)one (B)two (C)three
(D)four (E)five

8. 若 n 为一个完全平方数，则下一个大于 n 的完全平方数是多少？

(A)n^2+1 (B)n^2+n (C)$2n+1$
(D)$n+2\sqrt{n}+1$ (E)上述答案都不对

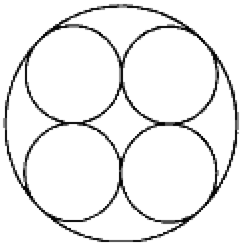
9. 本骑车前往一座城市，去时的速度为 x，回来时的速度为 y。他整个行程的平均速度是多少？

(A)$\frac{xy}{2}$ (B)$\frac{x+y}{2}$ (C)$\frac{2x+2y}{xy}$
(D)$\frac{2xy}{x+y}$ (E)$\frac{x+y}{xy}$

10. 一场足球比赛的最终得分为 C 队 m 分，D 队 n 分。半场结束时的得分可能有多少种不同的结果？

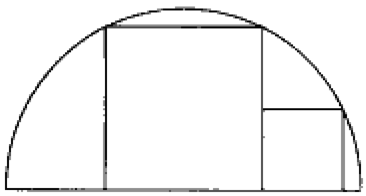
(A)$mn+1$ (B)$m+n+1$ (C)$(m+1)(n+1)$
(D)mn (E)$m+n+mn$

11. 如图所示，一家电话公司将四根圆形电缆放置在一根圆管中。若电缆的直径为 1，则装这四根电缆的圆管的直径是多少？



(A)$1+\sqrt{2}$ (B)$\sqrt{5}$
(C)$2\sqrt{2}$ (D)$1+\sqrt{3}$
(E)$2\sqrt{3}$

12. 如图所示，一个半圆中内接有两个正方形，若小正方形的面积是 7，大正方形的面积是多少？



7. How many letters are there in the correct answer to this question?

(A)one (B)two (C)three
(D)four (E)five

8. If n is a perfect square, then the next perfect square greater than n is

(A)n^2+1 (B)n^2+n (C)$2n+1$
(D)$n+2\sqrt{n}+1$ (E)none of these

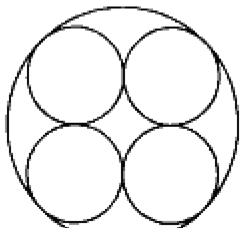
9. Ben cycles to a cits at average speed x and returns at average speed y. His average speed for the whole trip is

(A)$\frac{xy}{2}$ (B)$\frac{x+y}{2}$ (C)$\frac{2x+2y}{xy}$
(D)$\frac{2xy}{x+y}$ (E)$\frac{x+y}{xy}$

10. The final score in a soccer match is Cm, Dn. The possible number of different half-time scores is

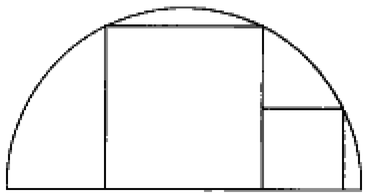
(A)$mn+1$ (B)$m+n+1$ (C)$(m+1)(n+1)$
(D)mn (E)$m+n+mn$

11. A phone company places four circular cables in a circular pipe so that they touch as shown. If the diameter of a cable is 1, then the diameter of the pipe holding the four cables is



(A)$1+\sqrt{2}$ (B)$\sqrt{5}$ (C)$2\sqrt{2}$
(D)$1+\sqrt{3}$ (E)$2\sqrt{3}$

12. Two squares are inscribed in a semicircle as shown. If the area of the smaller square is 7, the area of the larger square is

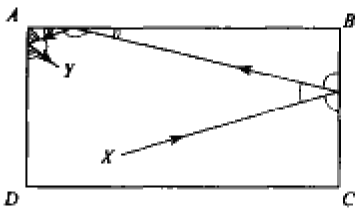


(A)28　　(B)14　　(C)21
(D)$8\sqrt{7}$　　(E)$14\sqrt{2}$

13. 一个圆盘放在一个正方形的棋盘上，并且与棋盘的四边相切。正方形棋盘上有 64 个小方格，问圆盘可以完全覆盖多少个小方格？
(A)48　　(B)32　　(C)36
(D)44　　(E)40

14. 米切尔和埃莉进行 10 千米赛跑。埃莉用了 50 分钟完成赛程，并且领先米切尔 500 米。为给米切尔一次机会，第二次比赛时埃莉在离起跑线 500 米处开始赛跑。若这一次两人的速度与上一次比赛相同，则这次比赛的结果会是怎样？
(A)埃莉领先 25 米
(B)米切尔领先 20 米
(C)同时到达终点
(D)埃莉领先 10 米
(E)米切尔领先 15 米

15. 一张长方形的台球桌长 2 米、宽 1 米。一个球在 X 点被击中，并且如图所示最终停在 Y 点。X 点到 AD 的距离为 0.6 米，到 DC 的距离为 0.2 米。Y 点到 AD 的距离为 0.2 米，到 AB 的距离为 0.25 米。若球总是以同样的角度击中桌边后反弹，则球从 X 到 Y 一共滚了有多少米？



(A)3.75　　(B)3.50　　(C)4.25
(D)3.80　　(E)4.00

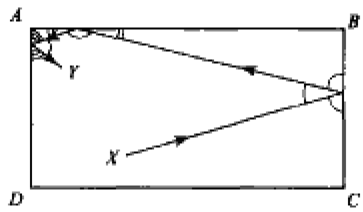
16. O 点在正方形 $ABCD$ 中运动，并且总是有 $x+y=180°$。O 点的运动轨迹是什么？

(A)28　　(B)14　　(C)21
(D)$8\sqrt{7}$　　(E)$14\sqrt{2}$

13. A circular disc is placed on a square chess board (64 equal squares) so that it touches the edges of the chess board. How many of the 64 squares are *completely* covered by the disc?
(A)48　　(B)32　　(C)36
(D)44　　(E)40

14. When Michael and Ellie ran a 10 km race, Ellie won by 500 m and took 50 min. To give Michael a chance, the next time they raced Ellie started 500 m behind the starting line. If they ran at exactly the same speeds as in the first race, then the result of the next race was
(A)Ellie wins by 25 m
(B)Michael wins by 20 m
(C)they finish together
(D)Ellie wins by 10 m
(E)Michael wins by 15 m

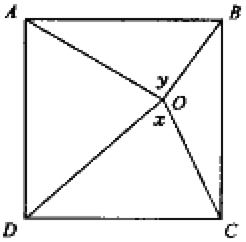
15. A ball is hit on a rectangular pool table, 2 m by 1 m, from a point X. It comes to rest at Y, as shown in the diagram. X is 0.6 m from AD and 0.2 m from DC. Y is 0.2 m from AD and 0.25 m from AB. If the ball always rebounds at the same angle as it hits the side, then it travels a distance, in metres, of



(A)3.75　　(B)3.50　　(C)4.25
(D)3.80　　(E)4.00

16. A point O moves inside a square $ABCD$ so that the angles $x+y=180°$. As O moves it traces out

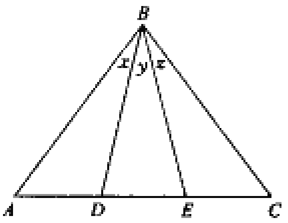
(A)正方形的四周
(B)整个内部区域
(C)仅为正方形的中心
(D)两个对称轴
(E)对角线



17. 一名建筑工人用 9 个小时可以建一面墙，另一名建筑工人需要用 10 小时才能建相同的一面墙。若他们两人一起工作，有时会停下来聊天，这样每个小时会少砌 10 块砖。若他们一起用 5 小时砌完这面墙，则这面墙一共有多少块砖？

(A)900　(B)1 080　(C)540
(D)990　(E)720

18. 如图所示，若 $AD = DE = EC$，则 $\angle ABC$ 是多少度 x、y 和 z 三个角才能相等？



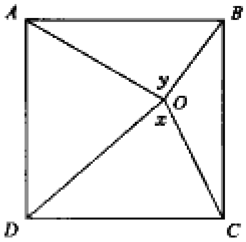
(A)90°　(B)120°
(C)45°　(D)60°
(E)三个角不可能相等

19. 威廉和特尔击中目标的概率均为 50%。他们决定进行比赛，轮流射击，直到 1 个人先击中目标为止。问首先射击的一个人赢的概率有多大？

(A)$\frac{1}{2}$　(B)$\frac{2}{3}$　(C)$\frac{3}{4}$
(D)$\frac{5}{6}$　(E)$\frac{7}{8}$

20. 5 名政客作了如下列陈述：
安娜："查尔斯和杜米萨利说了谎"。
本："安娜和埃莉说了谎"。
查尔斯："本和杜米萨利说了谎"。

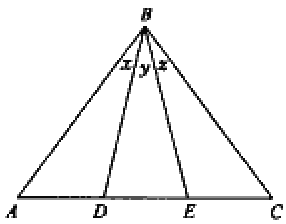
(A) the perimeter
(B) the whole of the interior
(C) only the centre of the square
(D) the two dotted axes of symmetry shown
(E) the diagonals



17. A bricklayer would take 9 hours to build a certain wall on his own and another bricklayer would take 10 hours to build the same wall. If the two work together, they sometimes stop for a chat, so that they lay a total of 10 fewer bricks per hour. If it takes them 5 hours to build the wall together, then the number of bricks in the wall is

(A)900　(B)1 080　(C)540
(D)990　(E)720

18. If $AD = DE = EC$, then the three angles x, y and z will be equal when angle $\angle ABC$ equals



(A)90°　(B)120°
(C)45°　(D)60°
(E) it is impossible for x, y and z to be equal

19. Both William and Tell hit their target half the time. They decide to fight a duel in which they exchange shots until one is hit. What are the chances that the one that shoots first will win?

(A)$\frac{1}{2}$　(B)$\frac{2}{3}$　(C)$\frac{3}{4}$
(D)$\frac{5}{6}$　(E)$\frac{7}{8}$

20. Five politicians make the following statements:
Anna: "Charles and Dumisani are lying".
Ben: "Anna and Ellie are lying".
Charles: "Ben and Dumisani are lying".

杜米萨利:"安娜和本说了谎"。

埃莉:"安娜和本说了谎"。

问哪名政客肯定说了谎?

(A)安娜　(B)本　(C)查尔斯

(D)杜米萨利　(E)埃莉

Dumisani: "Charles and Ellie are lying".

Ellie: "Anna and Ben are lying".

Which politician is definitely lying?

(A) Anna　(B) Ben　(C) Charles

(D) Dumisani　(E) Ellie

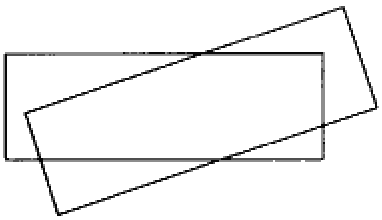
试 卷 十

Test 10

1. 2^{20}的一半是多少?

(A)1^{10}　(B)1^{20}　(C)20　(D)2^{10}　(E)2^{19}

2. 如图所示有两个长方形相交,并形成了五个封闭的区域。在一张纸上画任意两个相交的长方形,最多能形成多少个封闭的区域?



(A)10　(B)9　(C)8　(D)7　(E)6

3. $3\sqrt{11}, 4\sqrt{7}, 5\sqrt{5}, 6\sqrt{3}, 7\sqrt{2}$中有几个数大于10?

(A)1　(B)3　(C)5　(D)4　(E)2

4. 若 n 为任意正整数,2^n 除以 7 可能有多少个不同的余数?

(A)5　(B)3　(C)2　(D)4　(E)1

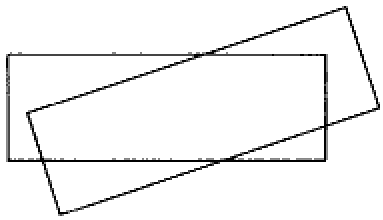
5. 两个数的和是10,这两个数的平方差是40,则这两个数的平方和是多少?

(A)50　(B)30　(C)10　(D)58　(E)100

1. Half of 2^{20} equals

(A)1^{10}　(B)1^{20}　(C)20　(D)2^{10}　(E)2^{19}

2. The diagram shows two rectangles that enclose five regions. The largest number of regions that can be enclosed by any two rectangles drawn on a sheet of paper is



(A)10　(B)9　(C)8　(D)7　(E)6

3. How many of the following numbers are greater than 10?

$$3\sqrt{11}\quad 4\sqrt{7}\quad 5\sqrt{5}\quad 6\sqrt{3}\quad 7\sqrt{2}$$

(A)1　(B)3　(C)5　(D)4　(E)2

4. If n is any positive integer, how many different remainders are possible when 2^n is divided by 7?

(A)5　(B)3　(C)2　(D)4　(E)1

5. The sum of two numbers is 10 and the difference between their squares is 40. The sum of their squares is

(A)50　(B)30　(C)10　(D)58　(E)100

6. 直角三角形的斜边 z 和一直角边 x 是两个相邻的整数，问另一直角边的平方是多少？

(A) $z-x$　　(B) $z+x$　　(C) zx

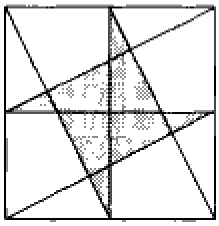
(D) $\frac{z}{x}$　　(E)上述答案都不对

7. 将前 10 个质数按从小到大的顺序排列，组成一个数(注：1 不是质数)。从这个数中去掉 5 个数字，并且在不改变排列顺序的前提下，使剩下的数字组成的新数尽可能的大，这个新数中的第 2 个数字是多少？

(A)2　　(B)3　　(C)5

(D)7　　(E)9

8. 图中星形阴影部分的顶角是大正方形各边的中点。阴影部分的面积是大正方形面积的几分之几？

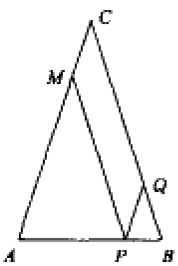


(A) $\frac{1}{5}$　　(B) $\frac{1}{4}$

(C) $\frac{1}{3}$　　(D) $\frac{3}{8}$

(E) $\frac{2}{5}$

9. 在 $\triangle ABC$ 中，$AC=BC=15$，$PM \parallel BC$，$PQ \parallel AC$。$PQCM$ 的周长是多少？



(A)不能确定

(B)20　　(C)30

(D)40　　(E)15

10. 边长为 1 的正六边形与边长为 3 的等边三角形的面积之比是多少？

(A)2:3　　(B)2:1　　(C)5:6

(D)3:4　　(E)1:1

6. The hypotenuse z and one side x of a right-angled triangle are consecutive integers. The square of the third side is

(A) $z-x$　　(B) $z+x$　　(C) zx

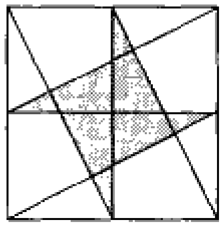
(D) $\frac{z}{x}$　　(E) None of these

7. A number is formed by writing the first ten primes in increasing order. (Remember that 1 is not a prime number.) Half of the digits are now crossed out so that the number formed by the remaining digits, without changing their order, is as large as possible. The second digit from the left of this new number is

(A)2　　(B)3　　(C)5

(D)7　　(E)9

8. In the diagram a corner of the shaded star is at the midpoint of each side of the large square. The fraction of the large square covered by the star is

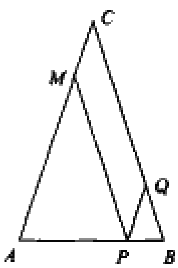


(A) $\frac{1}{5}$　　(B) $\frac{1}{4}$

(C) $\frac{1}{3}$　　(D) $\frac{3}{8}$

(E) $\frac{2}{5}$

9. In $\triangle ABC$, $AC = BC = 15$, PM is parallel to BC and PQ is parallel to AC. The perimeter of $PQCM$ is



(A) cannot be determined

(B)20　　(C)30

(D)40　　(E)15

10. The ratio of the area of a regular hexagon with side 1 to the area of an equilateral triangle with side 3 is

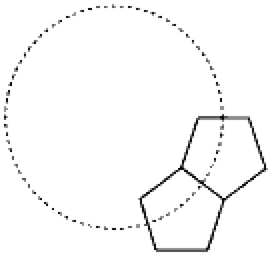
(A)2:3　　(B)2:1　　(C)5:6

(D)3:4　　(E)1:1

11. 9 个数按从小到大的顺序排列，中间的数字恰好是这 9 个数的平均值。5 个最大的数的平均值是 68，5 个最小的数的平均值是 44。问这 9 个数的和是多少？

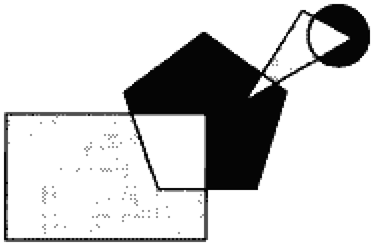
(A)560 (B)504 (C)112
(D)56 (E)70

12. 将完全相同的正五边形按图排列组成一个圆圈。图中排列了前两个正五边形。问需要多少个正五边形才能组成一个完整的圆圈？



(A)9
(B)10
(C)11
(D)12
(E)13

13. 如图所示有长方形、五边形、三角形和圆形，面积分别为 121、81、49 和 25。问浅色阴影部分与深色阴影部分的面积差是多少？



(A)25 (B)36
(C)49 (D)64
(E)信息不足，不能确定

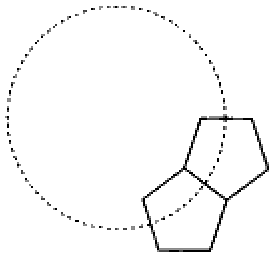
14. 约翰告诉凯蒂 3 个正整数的乘积是 36。约翰还告诉她这 3 个正整数的和，但她仍没有足够信息去找到这 3 个数，问这 3 个数的和是多少？

(A)11 (B)13 (C)14
(D)16 (E)不能确定

11. Nine numbers are written in ascending order. The middle number is also the average of the nine numbers. The average of the five largest numbers is 68 and the average of the five smallest numbers is 44. The sum of all the numbers is

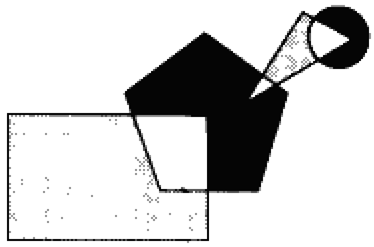
(A)560 (B)504 (C)112
(D)56 (E)70

12. Identical regular pentagons are placed together side by side to form a ring in the manner shown. The diagram shows the first two pentagons. How many are needed to make a full ring?



(A)9 (B)10 (C)11
(D)12 (E)13

13. The diagram shows a rectangle, pentagon, triangle and circle with respective areas 121, 81, 49 and 25. The difference between the lightly shaded area and the black area is



(A)25 (B)36
(C)49 (D)64
(E) Not possible to determine with the given information

14. Johann tells Kitty that the product of three positive integers is 36. Johann also tells her the sum of the numbers, but she still does not have enough information to find the three numbers. The sum of the three numbers is

(A)11 (B)13 (C)14
(D)16 (E) Impossible to determine

15. 两个罐子中装有同样数量的玻璃球。玻璃球是红色或白色。第一个罐子中红色玻璃球的数量与白色玻璃球数量之比为 7:1,第二个罐子中两种球的数量比为 9:1,若一共有 90 个白色玻璃球,则第二个罐子中有多少个红色玻璃球?

(A)360　　(B)400

(C)450　　(D)36

(E)40

16. 一个有两位数的整数是其个位数和十位数之和的 q 倍。交换个位数和十位数的位置形成一个新的数。这个新形成的数是其个位数和十位数之和的多少倍?

(A)$9-q$　　(B)$10-q$

(C)$11-q$　　(D)$q-1$

(E)$q+1$

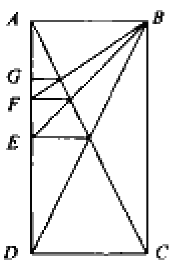
17. 有多少种方法可以从 1 至 9 中选出 7 个数,使这 7 个数的和是 3 的倍数?

(A)小于 10　　(B)10

(C)11　　(D)12

(E)大于 12

18. 如图所示,$ABCD$ 是一个长方形,从 G、F、E 引出的小横线段都平行于 AB。若 $AD=12$,则 AG 等于多少?



(A)$\sqrt{10}$　　(B)$\frac{5}{2}$

(C)4　　(D)$\sqrt{8}$

(E)3

19. 8 个小孩分成 4 组,每组 2 个人。问一共有多少种不同的组合方法?

(A)120　　(B)35　　(C)24

(D)12　　(E)105

15. Two jars contain an equal numbers of marbles. The marbles are either red or white. The ratio of red to white marbles is 7:1 in the first jar and 9:1 in the second jar. If there are 90 white marbles altogether, then the number of red marbles in the second jar is

(A)360　　(B)400

(C)450　　(D)36

(E)40

16. If a two-digit integer is q times the sum of its digits, then the number formed by interchanging the two digits is the sum of the digits multiplied by

(A)$9-q$　　(B)$10-q$

(C)$11-q$　　(D)$q-1$

(E)$q+1$

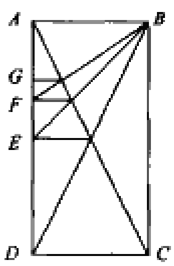
17. In how many different ways can seven numbers be chosen from the numbers 1 to 9, inclusive, so that the seven numbers have a sum which is a multiple of 3?

(A)Fewer than 10　　(B)10

(C)11　　(D)12

(E)More than 12

18. $ABCD$ is a rectangle and the lines ending at E, F and G are all parallel to AB, as shown. If $AD=12$, then AG equals



(A)$\sqrt{10}$　　(B)$\frac{5}{2}$

(C)4　　(D)$\sqrt{8}$

(E)3

19. Eight children must be divided into four teams of two players each. The number of different ways in which this can be done is

(A)120　　(B)35　　(C)24

(D)12　　(E)105

20. 对于任何正整数有函数 f,并且满足

$f(1)=2\,005$

和 $f(1)+f(2)+\cdots+f(n)=n^2 f(n), n>1$

计算 $f(2\,004)$的值。

(A)$\frac{1}{2\,004}$ (B)$\frac{1}{1\,002}$ (C)$\frac{2\,004}{2\,005}$

(D)2 (E)2 004

20. A function f is defined for all positive integers and satisfies

$$f(1)=2\,005$$

and

$$f(1)+f(2)+\cdots+f(n)=n^2 f(n)$$

for all $n>1$. The value of $f(2\,004)$ is

(A)$\frac{1}{2\,004}$ (B)$\frac{1}{1\,002}$ (C)$\frac{2\,004}{2\,005}$

(D)2 (E)2 004

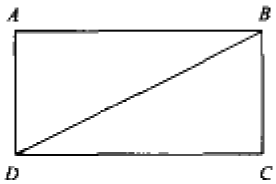
试卷十一

Test 11

1. 两个正整数 p 和 q 的乘积是 100。问 $p+q$ 可能的最大值是多少?

(A)52　(B)101　(C)20
(D)29　(E)25

2. 图中 $ABCD$ 是一个长方形,$DC=12$。若 $\triangle BDC$ 的面积是 30,问长方形 $ABCD$ 的周长是多少?

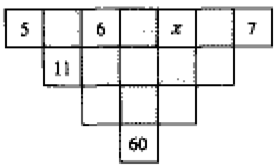


(A)34　(B)44
(C)30　(D)29
(E)60

3. 三角形三个顶点的坐标分别为(1,1),(7,1)和(5,3)。问这个三角形的面积是多少?

(A)12　(B)8　(C)6
(D)7　(E)9

4. 空格中的数是上层两侧数字的和。(例如 $11=5+6$)。问 x 的值一定是多少?



(A)4　(B)6
(C)9　(D)15
(E)10

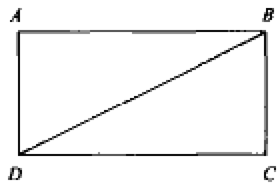
5. 一个五位正整数各位数字的和是 2(五位整数的第一位不能是零)。问有多少个这样的五位数?

(A)1　(B)2　(C)3
(D)4　(E)5

1. The product of two positive integers p and q is 100. What is the largest possible value of $p+q$?

(A)52　(B)101　(C)20
(D)29　(E)25

2. In the diagram, $ABCD$ is a rectangle with $DC=12$. If the area of triangle BDC is 30, what is the perimeter of rectangle $ABCD$?

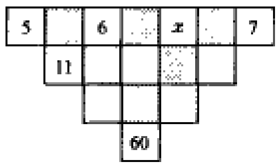


(A)34　(B)44　(C)30
(D)29　(E)60

3. The vertices of a triangle have coordinates (1, 1), (7, 1) and (5, 3). What is the area of this triangle?

(A)12　(B)8　(C)6
(D)7　(E)9

4. The number in an unshaded square is obtained by adding the numbers connected to it from the row above. (The "11" is one such number.) The value of x must be



(A)4　(B)6　(C)9
(D)15　(E)10

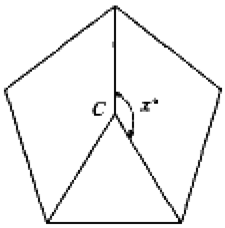
5. The sum of the digits of a five-digit positive integer is 2. (A five-digit integer cannot start with zero.) The number of such integers is

(A)1　(B)2　(C)3

6. 若 $x+y+z=25$, $x+y=19$, $y+z=18$，则 y 等于多少？

(A)13 (B)17
(C)12 (D)6
(E)-6

7. 图中是一个中心为 C 的正五边形。问 x 是多少度？



(A)144 (B)150
(C)120 (D)108
(E)72

8. 若一个正方体的表面积是 54，它的体积是多少？

(A)36 (B)9
(C)$\frac{81\sqrt{3}}{8}$ (D)27
(E)$162\sqrt{6}$

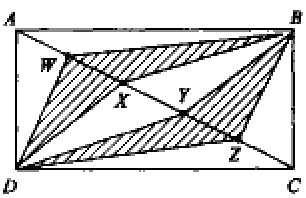
9. x, y 都是正整数，问方程 $3x+y=100$ 有多少对解？

(A)33 (B)35 (C)100
(D)101 (E)97

10. 若 $\sqrt{y-5}=5$, $2^x=8$，则 $x+y$ 等于多少？

(A)13 (B)28 (C)33
(D)35 (E)38

11. 长方形 $ABCD$ 的长为 9，宽为 5，对角线 AC 被点 W, X, Y 和 Z 均分成 5 份。计算阴影部分的面积。



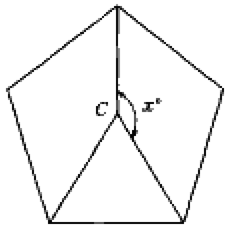
(A)36 (B)$\frac{36}{5}$
(C)18 (D)$\frac{4\sqrt{106}}{5}$

(D)4 (E)5

6. If $x+y+z=25$, $x+y=19$ and $y+z=18$, then y equals

(A)13 (B)17
(C)12 (D)6
(E)-6

7. A regular pentagon with centre C is shown. The value of x is



(A)144 (B)150
(C)120 (D)108
(E)72

8. If the surface area of a cube is 54, what is its volume?

(A)36 (B)9
(C)$\frac{81\sqrt{3}}{8}$ (D)27
(E)$162\sqrt{6}$

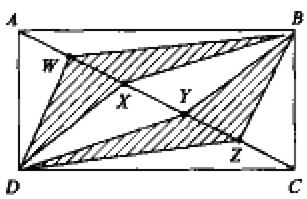
9. The number of solutions (x, y) of the equation $3x+y=100$, where x and y are positive integers, is

(A)33 (B)35 (C)100
(D)101 (E)97

10. If $\sqrt{y-5}=5$ and $2^x=8$, then $x+y$ equals

(A)13 (B)28 (C)33
(D)35 (E)38

11. Rectangle $ABCD$ has length 9 and width 5. Diagonal AC is divided into 5 equal parts at W, X, Y, and Z. Determine the area of the shaded region.



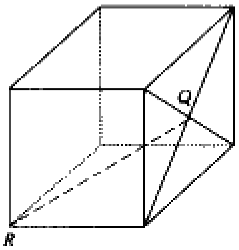
(A)36 (B)$\frac{36}{5}$
(C)18 (D)$\frac{4\sqrt{106}}{5}$

(E)$\frac{2\sqrt{106}}{5}$

12. 若 $N=(7^{p+4})(5^{q})(2^{3})$是一个完全立方数，$p$ 和 q 都是正整数，$p+q$ 可能的最小值是多少？

(A)5　(B)2　(C)8
(D)6　(E)12

13. Q 是立方体一面上对角线的交点，立方体的边长为 2 个单位，QR 的长度是多少？

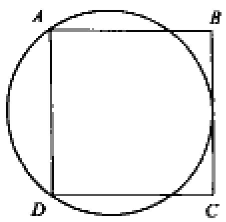


(A)2　(B)$\sqrt{8}$
(C)$\sqrt{5}$　(D)$\sqrt{12}$
(E)$\sqrt{6}$

14. 安德森先生班里的学生人数多于 25 个，班上的男生人数大于 2、小于 10，女生人数大于 14、小于 23。问有多少种不同的男女生人数满足这些条件？

(A)5　(B)6　(C)7
(D)3　(E)4

15. 正方形 $ABCD$ 的边长为 8，一个圆通过 A 点和 D 点，并与 BC 相切。问圆的半径是多少？



(A)4　(B)5
(C)6　(D)$4\sqrt{2}$
(E)5.25

16. 当贝蒂将 $x=1$ 带入表达式 ax^3-2x+c 时，其值为 -5。当她将 $x=4$ 带入表达式时，其值为 52，当 x 为多少时可以使表达式的值为零？

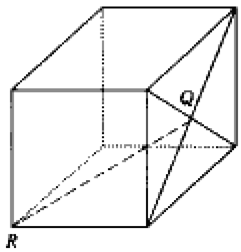
(A)2　(B)$\frac{5}{2}$　(C)3

(E)$\frac{2\sqrt{106}}{5}$

12. If $N=(7^{p+4})(5^{q})(2^{3})$ is a perfect cube, where p and q are positive integers, the smallest possible value of $p+q$ is

(A)5　(B)2　(C)8
(D)6　(E)12

13. Q is the point of intersection of the diagonals of one face of a cube whose edges have length 2 units. The length of QR is

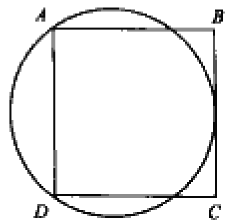


(A)2　(B)$\sqrt{8}$
(C)$\sqrt{5}$　(D)$\sqrt{12}$
(E)$\sqrt{6}$

14. Mr. Anderson has more than 25 students in his class. He has more than 2 but fewer than 10 boys and more than 14 but fewer than 23 girls in his class. How many different class *sizes* would satisfy these conditions?

(A)5　(B)6　(C)7
(D)3　(E)4

15. Each side of square $ABCD$ is 8. A circle is drawn through A and D so that it is tangent to BC. What is the radius of this circle?



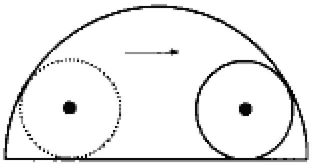
(A)4　(B)5　(C)6
(D)$4\sqrt{2}$　(E)5.25

16. When Betty substitutes $x=1$ into the expression ax^3-2x+c, its value is -5. When she substitutes $x=4$, the expression has value 52. One value of x that makes the expression equal to zero is

(A)2　(B)$\frac{5}{2}$　(C)3

(D)$\frac{7}{2}$　　(E)4

17. 一个半径为 8 的轮子沿着一个半圆的直径滚动直到它撞到半圆上(半圆的半径为 25)。问轮子不能接触到的直径有多长?



(A)8　　(B)12　　(C)15
(D)17　　(E)20

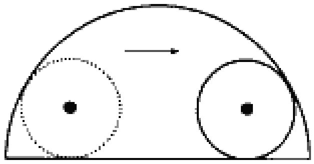
18. 有 4 个不等的正整数 a,b,c,N,使 $N=5a+3b+5c$ 且 $N=4a+5b+4c$,N 的值介于 131 到 150 之间。问 $a+b+c$ 的值是多少?
(A)13　　(B)17　　(C)22
(D)33　　(E)36

19. 三块地毯的总面积是 200 平方米。地毯部分重叠后覆盖的地板面积是 140 平方米,被两层地毯覆盖的地板面积是 24 平方米。问被三层地毯覆盖的地板面积是多少?
(A)12 平方米　(B)18 平方米　(C)24 平方米
(D)36 平方米　(E)42 平立米

20. 一种将 10 000 个直径为 1 的圆放置在一个大小为 100×100 的正方形内的方法,就是将圆摆放 100 排,每一排放 100 个圆。若将这些圆重新摆放,并使任何三个相切的圆的圆心连线构成一个等边三角形。问这种摆放方法可以比原先的方法多放置多少个圆?
(A)647　　(B)1 442　　(C)1 343
(D)1 443　　(E)1 344

(D)$\frac{7}{2}$　　(E)4

17. A wheel of radius 8 rolls along the diameter of a semicircle of radius 25 until it bumps into this semicircle. What is the length of the portion of the diameter that cannot be touched by the wheel?



(A)8　　(B)12　　(C)15
(D)17　　(E)20

18. There are four unequal, positive integers a, b, c, and N such that $N=5a+3b+5c$. It is also true that $N=4a+5b+4c$ and N is between 131 and 150. What is the value of $a+b+c$?
(A)13　　(B)17　　(C)22
(D)33　　(E)36

19. Three rugs have a combined area of 200 m^2. By overlapping the rugs to cover a floor area of 140 m^2, the area which is covered by exactly two layers of rug is 24 m^2. What area of floor is covered by three layers of rug?
(A)12 m^2　　(B)18 m^2　　(C)24 m^2
(D)36 m^2　　(E)42 m^2

20. One way to pack a 100 by 100 square with 10 000 circles, each of diameter 1, is to put them in 100 rows with 100 circles in each row. If the circles are repacked so that the centres of any three tangent circles form an equilateral triangle, what is the maximum number of additional circles that can be packed?
(A)647　　(B)1 442　　(C)1 343
(D)1 443　　(E)1 344

试卷十二

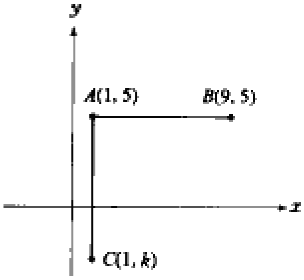
Test 12

1. 若 $x=4$，$y=3x$，$z=2y$，则 $y+z$ 等于多少？

   (A)12　(B)20　(C)40
   (D)24　(E)36

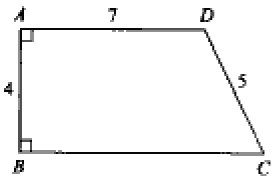
2. 图中 AB 和 AC 长度相等。问 k 的值是多少？

   (A) -3　(B) -4
   (C) -5　(D) -7
   (E) -8



3. 图中 $AD<BC$。问 $ABCD$ 的周长是多少？

   (A)23　(B)26
   (C)27　(D)28
   (E)30

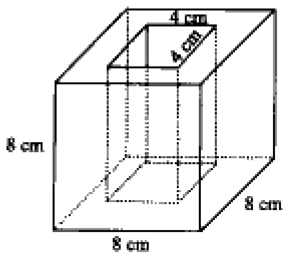


4. 购买三张 CD 的平均花费为 15 美元。若购买第四张 CD 后平均花费变为 16 美元，问买第四张 CD 花了多少钱？

   (A)16 美元　(B)17 美元　(C)18 美元
   (D)19 美元　(E)20 美元

5. 如图所示，一个边长为 8 厘米的正方体中央有一个边长为 4 厘米的方洞。问余下的体积是多少立方厘米？

   (A)64　(B)128
   (C)256　(D)384

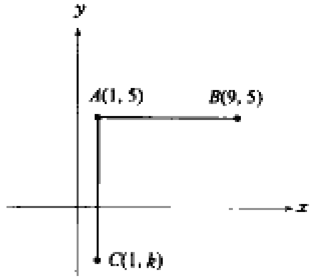


1. If $x=4$ and $y=3x$ and $z=2y$, then the value of $y+z$ is

   (A)12　(B)20　(C)40
   (D)24　(E)36

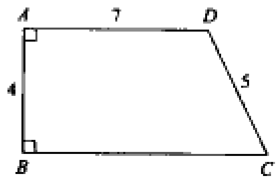
2. In the diagram, AB and AC have equal lengths. What is the value of k?

   (A) -3　(B) -4
   (C) -5　(D) -7
   (E) -8



3. In the diagram, $AD<BC$. What is the perimeter of $ABCD$?

   (A)23　(B)26
   (C)27　(D)28
   (E)30

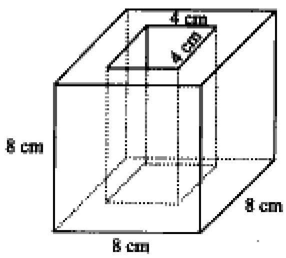


4. Three CD's are bought at an average cost of \$15 each. If a fourth CD is purchased, the average cost becomes \$16. What is the cost of the fourth CD?

   (A) \$16　(B) \$17　(C) \$18
   (D) \$19　(E) \$20

5. An 8 cm cube has a 4 cm square hole cut through its centre, as shown. What is the remaining volume, in cm^3?

   (A)64　(B)128
   (C)256　(D)384



(E)448

6. 电子表上显示的时间是 5:55。问多少分钟后电子表又会出现相同的数字？

(A)71 (B)72 (C)255
(D)316 (E)436

7. 数字 49,29,9,40,22,15,53,33,13,47 中两个数字为一组，并且各组数字的和均相等。问哪一个数与 15 是一组？

(A)33 (B)40 (C)47
(D)49 (E)53

8. 乘积$(5^2+1)\times(5^3+1)\times(5^{23}+1)$的个位数是多少？

(A)0 (B)1 (C)2
(D)5 (E)6

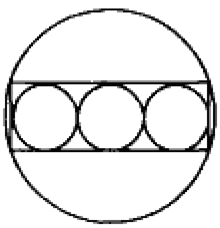
9. 在选举班长时，学生投 61 票从 4 个候选人中选一人。每个学生只能投一个候选人的票，得票最多的候选人获胜。获胜者至少要得多少票？

(A)15 (B)16 (C)21
(D)30 (E)31

10. 巧克力饮料中纯巧克力的体积含量是 6%。若在 50 升巧克力饮料中加入 10 升纯牛奶，这时饮料中巧克力含量是百分之几？

(A)5% (B)16% (C)10%
(D)3% (E)26%

11. 半径为 10 厘米的 3 个圆相切，并且它们的圆心在一条直线上。这 3 个圆内接于一个长方形，长方形又内接于另一个圆。这个大圆的面积是多少平方厘米？



(E)448

6. The time on a digital clock is 5:55. How many minutes will pass before the clock next shows a time with all digits identical?

(A)71 (B)72 (C)255
(D)316 (E)436

7. The numbers 49, 29, 9, 40, 22, 15, 53, 33, 13, 47 are grouped in pairs so that the sum of each pair is the same. Which number is paired with 15?

(A)33 (B)40 (C)47
(D)49 (E)53

8. The units digit in the product $(5^2+1)\times(5^3+1)\times(5^{23}+1)$ is

(A)0 (B)1 (C)2
(D)5 (E)6

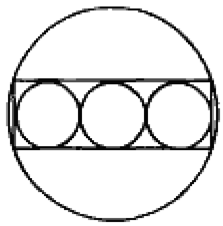
9. In an election for class president, 61 votes are cast by students who are voting to choose one of four candidates. Each student must vote for only one candidate. The candidate with the highest number of votes is the winner. The smallest number of votes the winner can receive is

(A)15 (B)16 (C)21
(D)30 (E)31

10. A chocolate drink is 6% pure chocolate, by volume. If 10 litres of pure milk are added to 50 litres of this drink, the percent of chocolate in the new drink is

(A)5% (B)16% (C)10%
(D)3% (E)26%

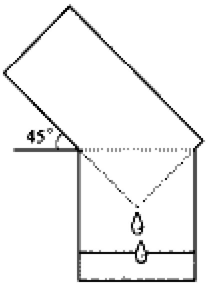
11. Three circles, each with a radius of 10 cm, are drawn tangent to each other so that their centres are all in a straight line. These circles are inscribed in a rectangle which is inscribed in another circle. The area of the largest circle is



(A)1 000π　(B)1 700π　(C)900π
(D)1 600π　(E)1 300π

12. 若 N 是一个各位数的乘积为 2 000 的最小的正整数。N 的各位数之和等于多少？
(A)21　(B)23　(C)25
(D)27　(E)29

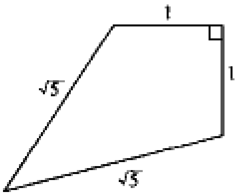
13. 如图所示，将圆桶中的水倒入一个直径 40 厘米、深 50 厘米的圆水杯，圆桶放置的角度与水平线成 45°。问水杯中的水有多深，才能使水与圆桶接触？



(A)10 厘米
(B)20 厘米
(C)30 厘米
(D)35 厘米
(E)40 厘米

14. 只有质数和完全平方数（注：如 9，25）之间的自然数被称为 B 数（例如 10 介于 9 和 11 之间，是一个 B 数，而 12 就不是）。问包括 10 在内的两位数有多少个 B 数？
(A)1　(B)2　(C)3
(D)4　(E)5

15. 给定的四边形的面积是多少？



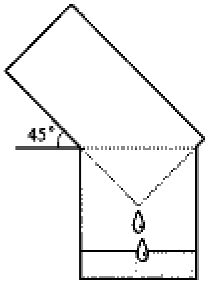
(A)$\frac{3}{2}$　(B)$\sqrt{5}$
(C)$\frac{1+\sqrt{10}}{2}$　(D)2
(E)3

16. 一个数由数字 1，2，…，9 构成。在这个数中，任何数字都可以多次使用，但相邻的数字不能相同，按照规则，相邻的一组数将不能再次出现（注：若这个数中有…713…，则不能再出现…71…，…13…）。问这个数最多可能是多少位数？

(A)1 000π cm^2 (B)1 700π cm^2 (C)900π cm^2
(D)1 600π cm^2 (E)1 300πcm^2

12. Let N be the smallest positive integer whose digits have a product of 2 000. The sum of the digits of N is
(A)21　(B)23　(C)25
(D)27　(E)29

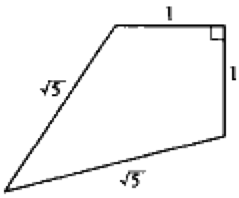
13. A cylindrical pail containing water drains into a cylindrical tub 40 cm across and 50 cm deep, while resting at an angle of 45° to the horizontal, as shown. How deep is the water in the tub when its level reaches the pail?



(A)10 cm　(B)20 cm　(C)30 cm
(D)35 cm　(E)40 cm

14. A number is *Beprisque* if it is the only natural number between a prime number and a perfect square (e. g. 10 is Beprisque but 12 is not). The number of *two-digit* Beprisque numbers(including 10)is
(A)1　(B)2　(C)3
(D)4　(E)5

15. The area of the given quadrilateral is

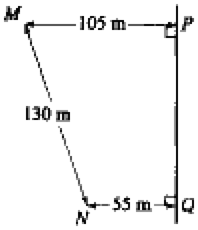


(A)$\frac{3}{2}$　(B)$\sqrt{5}$
(C)$\frac{1+\sqrt{10}}{2}$　(D)2
(E)3

16. A number is formed using the digits 1, 2, …9. Any digit can be used more than once, but adjacent digits cannot be the same. Once a pair of adjacent digits has occurred, that pair, in that order, cannot be used again. How many digits are in the largest such number?

(A)72　(B)73　(C)144
(D)145　(E)91

17. 一条主要的输气管道经过 P 和 Q 两点，要在 PQ 上找一点 T，以便引出一条供气管道向 M 点的房屋送气；还要从 T 点引出第二条供气管道向 N 点的房屋送气。问这两根供气管道的最短距离是多少米？



(A)200　(B)202　(C)198
(D)210　(E)214

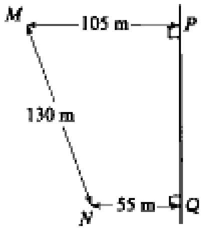
18. 从数组{4,7,10,13,…,46}中任选 3 个数，它们的和可以有多少个不同的值？
(A)45　(B)37　(C)36
(D)43　(E)42

19. 满足方程 $(x^2-5x+5)^{x^2+4x-60}=1$ 的所有 x 值的和是多少？
(A) −4　(B)3　(C)1
(D)5　(E)6

20. 若 $a=3^p, b=3^q, c=3^r, d=3^s$，并且 p,q,r,s 都是正整数，确定 $p+q+r+s$ 的最小值，使 $a^2+b^3+c^5=d^7$。
(A)17　(B)31　(C)106
(D)247　(E)353

(A)72　(B)73　(C)144
(D)145　(E)91

17. A main gas line runs through P and Q. From some point T on PQ, a supply line runs to a house at point M. A second supply line from T runs to a house at point N. What is the minimum total length of pipe required for the two supply lines?



(A)200　(B)202　(C)198
(D)210　(E)214

18. How many integers can be expressed as a sum of three distinct numbers chosen from the set {4,7,10,13,…,46}?
(A)45　(B)37　(C)36
(D)43　(E)42

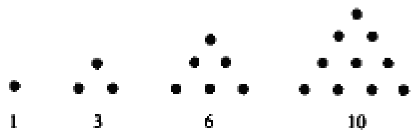
19. The sum of all values of x that satisfy the equation $(x^2-5x+5)^{x^2+4x-60}=1$ is
(A) −4　(B)3　(C)1
(D)5　(E)6

20. If $a=3^p, b=3^q, c=3^r$, and $d=3^s$ and if p, q, r, and s are positive integers, determine the smallest value of $p+q+r+s$ such that $a^2+b^3+c^5=d^7$.
(A)17　(B)31　(C)106
(D)247　(E)353

试卷十三

Test 13

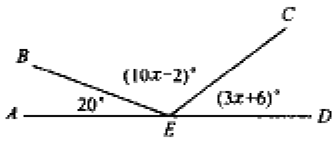
1. 如图所示，前四个三角形的数为 1，3，6 和 10，问第十个三角形的数是多少？



(A)55 (B)45 (C)66
(D)78 (E)50

2. 一个十位数为偶数，其各位数的和为 89。个位上的数字是几？
(A)0 (B)2 (C)4
(D)6 (E)8

3. 若 AD 为一条线段，E 是 AD 上的一点，问 $\angle CED$ 为多少度？

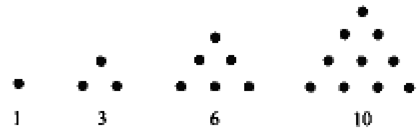


(A)20° (B)12° (C)42°
(D)30° (E)45°

4. 在 240 千米的旅程中，凯丽的父亲驾驶了 $\frac{1}{2}$ 的路程，凯丽的母亲驾驶了 $\frac{3}{8}$ 的路程，凯丽驾驶了余下的路程。问凯丽驾驶了多少千米？
(A)80 (B)40 (C)210
(D)30 (E)55

5. 一场比赛中，三名参赛选手的年龄分别为 15 岁

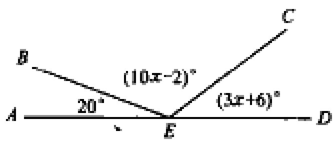
1. The first four triangular numbers 1, 3, 6 and 10 are illustrated in the diagram. What is the tenth triangular number?



(A)55 (B)45 (C)66
(D)78 (E)50

2. The sum of the digits of an even ten digit integer is 89. The last digit is
(A)0 (B)2 (C)4
(D)6 (E)8

3. If AD is a straight line segment and E is a point on AD, determine the measure of $\angle CED$.



(A)20° (B)12° (C)42°
(D)30° (E)45°

4. On a 240 kilometre trip, Corey's father drove $\frac{1}{2}$ of the distance. His mother drove $\frac{3}{8}$ of the total distance and Corey drove the remaining distance. How many kilometres did Corey drive?
(A)80 (B)40 (C)210
(D)30 (E)55

5. The ages of three contestants in a contest are 15

零9个月,16岁零1个月,15岁零8个月。他们的平均年龄是多大?

(A)15岁零8个月　(B)15岁零9个月

(C)15岁零10个月　(D)15岁零11个月

(E)16岁

years, 9 months; 16 years, 1 month; and 15 years, 8 months. Their average (mean) age is

(A)15 years, 8 months　(B)15 years, 9 months

(C)15 years, 10 months　(D)15 years, 11 months

(E)16 years

6. 一家商店削价销售T恤衫。以原价购买两件T恤衫后,第三件的买价即为1美元。买12件T恤衫共花了120.00美元。问一件T恤衫的原价是多少钱?

(A)10.00美元　(B)13.50美元　(C)14.00美元

(D)14.50美元　(E)15.00美元

6. A store had a sale on T-shirts. For every two T-shirts purchased at the regular price, a third T-shirt was bought for \$1.00. Twelve T-shirts were bought for \$120.00. What was the regular price for one T-shirt?

(A) \$10.00　(B) \$13.50　(C) \$14.00

(D) \$14.50　(E) \$15.00

7. 将自然数按1到 n 的顺序绕一个圆排列。若5对面的数是14,则 n 等于多少?

(A)14　(B)15　(C)16

(D)18　(E)20

7. Natural numbers are equally spaced around a circle in order from 1 to n. If the number 5 is directly opposite the number 14, then n is

(A)14　(B)15　(C)16

(D)18　(E)20

8. 19个连续整数的平均值是99。其中最大的整数是多少?

(A)118　(B)108　(C)109

(D)117　(E)107

8. The average of 19 consecutive integers is 99. The largest of these integers is

(A)118　(B)108　(C)109

(D)117　(E)107

9. 在每个空格中都放入一个正整数,并且相邻四个数的乘积均为120。问 x 的值是多少?

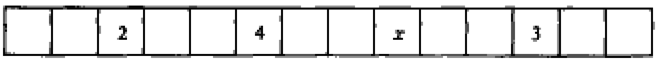
(A)1　(B)2　(C)3

(D)4　(E)5

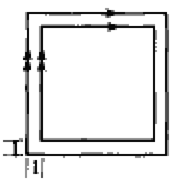
9. A positive integer is to be placed in each box. The product of any four adjacent integers is always 120. What is the value of x?

(A)1　(B)2　(C)3

(D)4　(E)5



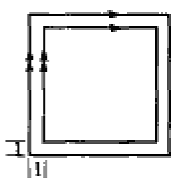
10. 八个正方形有相同的中心,对应边平行并且相隔为1个单位。图中显示两个最大的正方形。若最大的正方形的周长是96,问最小的正方形的周长是多少?



(A)40　(B)68　(C)32

(D)64　(E)89

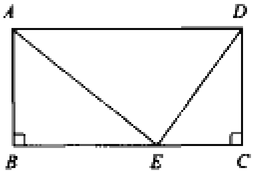
10. Eight squares with the same centre have parallel sides and are one unit apart. The two largest squares are shown. If the largest square has a perimeter of 96, what is the perimeter of the smallest square?



(A)40　(B)68　(C)32

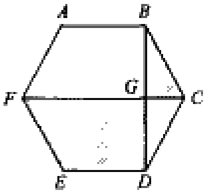
(D)64　(E)89

11. 图中，$ABCD$ 为长方形，$AD=13$，$DE=5$，$EA=12$，$ABCD$ 的面积是多少？



(A)39 (B)60 (C)52 (D)30 (E)25

12. 在正六边形 $ABCDEF$ 中，对角线 FC 和 BD 相交于 G，四边形 $FEDG$ 与△BCG 的面积比是多少？

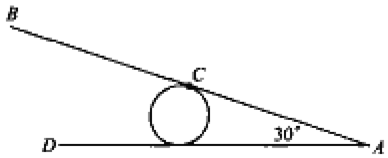


(A)$3\sqrt{3}:1$ (B)$4:1$ (C)$6:1$ (D)$2\sqrt{3}:1$ (E)$5:1$

13. 若 a、b、c 是三个不同的正整数，并且 $abc=16$，则 $a^b-b^c+c^a$ 可能的最大值是多少？

(A)253 (B)63 (C)249 (D)263 (E)259

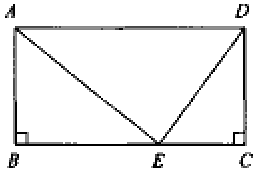
14. 金属杆 AB 的中点 C 与一个直径为 12 的圆鼓焊接在一起。金属杆 A 端着地并且与地面形成 30°角。圆鼓开始沿着 AD 向 D 的方向滚动。问圆鼓滚动多远才可使 B 点着地？



(A)π (B)2π (C)3π (D)4π (E)5π

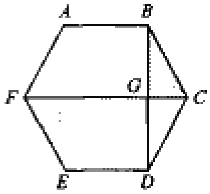
15. 使用整数 1,2,3,…,40 各一次，以形成 20 个整数对。配对的两个数之间的差值为 1 或 3(例如 5 可以与 2,4,6,8 配对)。若将所有的差值相加，其和可能的最大值是多少？

11. In the diagram, $ABCD$ is a rectangle with $AD=13$, $DE=5$ and $EA=12$. The area of $ABCD$ is



(A)39 (B)60 (C)52 (D)30 (E)25

12. In the regular hexagon $ABCDEF$, two of the diagonals, FC and BD, intersect at G. The ratio of the area of quadrilateral $FEDG$ to △BCG is

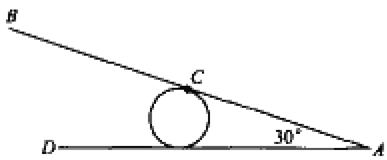


(A)$3\sqrt{3}:1$ (B)$4:1$ (C)$6:1$ (D)$2\sqrt{3}:1$ (E)$5:1$

13. If a, b and c are distinct positive integers such that $abc=16$, then the largest possible value of $a^b-b^c+c^a$ is

(A)253 (B)63 (C)249 (D)263 (E)259

14. A metal rod with ends A and B is welded at its middle, C, to a cylindrical drum of diameter 12. The rod touches the ground at A making a 30° angle. The drum starts to roll along AD in the direction of D. How far along AD must the drum roll for B to touch the ground?



(A)π (B)2π (C)3π (D)4π (E)5π

15. Twenty pairs of integers are formed using each of the integers 1, 2, 3, …, 40 once. The positive difference between the integers in each pair is 1 or 3. (Fox example, 5 can be paired with 2, 4, 6 or 8.) If the resulting differences are added

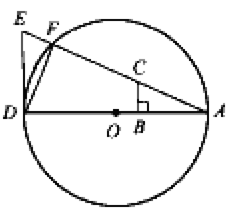
(A)50　(B)54　(C)56
(D)58　(E)60

16. 一个木质长方柱的尺寸是 $4\times5\times6$。柱体漆上绿色后再切成 $1\times1\times1$ 的正方块。有两个绿色面的方块个数与有三个绿色面的方块个数之比是多少？
(A)9:2　(B)9:4　(C)6:1
(D)3:1　(E)5:2

17. 一只蚂蚁在一个 18 厘米 × 150 厘米的长方形中爬行。蚂蚁的爬行路线为一条总是与长方形的边成 45°角的直线。蚂蚁从短边上的一点 X 出发，第一次到达对边时正好是对边的中点，问从 X 点到最近的顶角的距离是多少厘米？
(A)3　(B)4　(C)6
(D)8　(E)9

18. 一个有 2 000 位数的整数的第一位数字是 3。这个数中每个相邻的两个数字都可以被 17 或 23 整除。这个数的个位数可以是 a 或 b。$a+b$ 的值是多少？
(A)3　(B)7　(C)4
(D)10　(E)17

19. 图中，$\angle ABC=90°$，$CB\parallel ED$，$AB=DF$，$AD=24$，$AE=25$，O 为圆心。计算 $CBDF$ 的周长。



(A)39　(B)40
(C)42　(D)43
(E)44

20. 有方程 $x^2+x^2y^2+x^2y^4=525$ 和 $x+xy+xy^2=35$。满足两个方程的所有 y 值的和是多少？

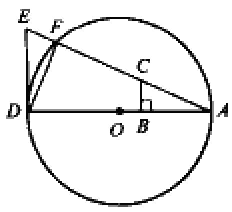
together, the greatest possible sum is
(A)50　(B)54　(C)56
(D)58　(E)60

16. A wooden rectangular prism has dimensions 4 by 5 by 6. This solid is painted green and then cut into 1 by 1 by 1 cubes. The ratio of the number of cubes with exactly two green faces to the number of cubes with three green faces is
(A)9:2　(B)9:4　(C)6:1
(D)3:1　(E)5:2

17. An ant walks inside a 18cm by 150cm rectangle. The ant's path follows straight lines which always make angles of 45° to the sides of the rectangle. The ant starts from a point X on one of the shorter sides. The first time the ant reaches the opposite side, it arrives at the midpoint. What is the distance, in centimetres, from X to the nearest corner of the rectangle?
(A)3　(B)4　(C)6
(D)8　(E)9

18. The left most digit of an integer of length 2 000 digits is 3. In this integer, any two consecutive digits must be divisible by 17 or 23. The 2 000th digit may be either "a" or "b". What is the value of $a+b$?
(A)3　(B)7　(C)4
(D)10　(E)17

19. In the diagram shown, $\angle ABC=90°$, $CB\parallel ED$, $AB=DF$, $AD=24$, $AE=25$ and O is the centre of the circle. Determine the perimeter of $CBDF$.



(A)39　(B)40　(C)42
(D)43　(E)44

20. For the system of equations $x^2+x^2y^2+x^2y^4=525$ and $x+xy+xy^2=35$, the sum of the real y

(A)20　　(B)2　　(C)$\frac{3}{2}$

(D)$\frac{55}{2}$　　(E)$\frac{5}{2}$

values that satisfy the equations is

(A)20　　(B)2　　(C)$\frac{3}{2}$

(D)$\frac{55}{2}$　　(E)$\frac{5}{2}$

试卷十四

Test 14

1. 若 $x=\frac{1}{4}$，问下列哪一个数值最大？

(A) x　(B) x^2　(C) $\frac{1}{2}x$

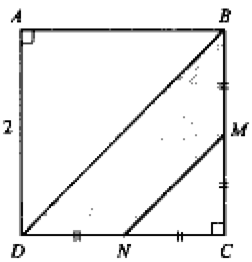
(D) $\frac{1}{x}$　(E) $\sqrt{x}$

2. 迪安在 28 场篮球比赛中的总得分是 252 分。鲁思比赛的场次比迪安少 10 场，但她每场比赛的平均得分比迪安高 0.5 分。问鲁思的总得分是多少？

(A)153　(B)171　(C)180

(D)266　(E)144

3. 图中，正方形 $ABCD$ 的边长为 2。M 和 N 分别为 BC 和 CD 的中点。阴影部分 $BMND$ 的面积是多少？

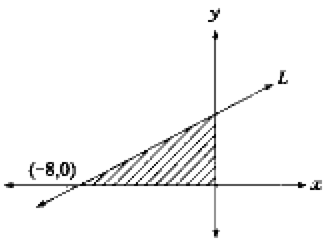


(A)1　(B) $2\sqrt{2}$

(C) $\frac{4}{3}$　(D) $\frac{3}{2}$

(E) $4-\frac{3}{2}\sqrt{2}$

4. 直线 L 与 x 轴的交点为 $(-8,0)$，阴影部分的面积是 16。问直线 L 的斜率是多少？



1. If $x=\frac{1}{4}$, which of the following has the largest value?

(A) x　(B) x^2　(C) $\frac{1}{2}x$

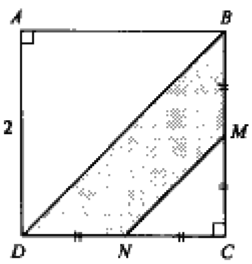
(D) $\frac{1}{x}$　(E) $\sqrt{x}$

2. Dean scored a total of 252 points in 28 basketball games. Ruth played 10 fewer games than Dean. Her scoring average was 0.5 points per game higher than Dean's scoring average. How many points, in total, did Ruth score?

(A)153　(B)171　(C)180

(D)266　(E)144

3. In the diagram, square $ABCD$ has side length 2, with M the midpoint of BC and N the midpoint of CD. The area of the shaded region $BMND$ is

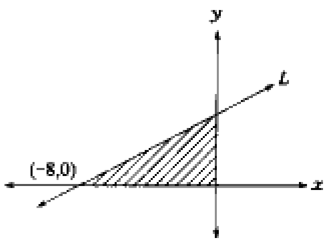


(A)1　(B) $2\sqrt{2}$

(C) $\frac{4}{3}$　(D) $\frac{3}{2}$

(E) $4-\frac{3}{2}\sqrt{2}$

4. The line L crosses the x-axis at $(-8,0)$. The area of the shaded region is 16. What is the slope of the line L?



(A)$\frac{1}{2}$　(B)4　(C)$-\frac{1}{2}$
(D)2　(E)-2

5. 若$[(10^3)(10^x)]^2=10^{18}$,x 等于多少?
(A)$\sqrt{2}$　(B)12　(C)6
(D)1　(E)3

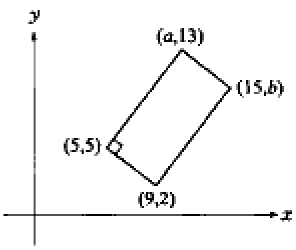
6. 五个连续整数的和是 75,这五个整数中的最大值与最小值之和等于多少?
(A)15　(B)25　(C)26
(D)30　(E)32

7. 正整数 N 除以 60,余数是 49。N 除以 15,余数是多少?
(A)0　(B)3　(C)4
(D)5　(E)8

8. 一个执委会的 6 名成员要召开一次会议。这 6 名成员给各自的 6 个下属打电话,每个下属又给各自的 6 个下属再打电话。若每个人都只被通知了一次,问有多少人知道要开会?
(A)18　(B)36　(C)216
(D)252　(E)258

9. 数列 3,20,37,54,71,…和数列 16,27,38,49,60,71,…中都有 71 这一项。这两个数列中下一个相同的项是多少?
(A)115　(B)187　(C)258
(D)445　(E)1 006

10. 图中有一个长方形,$a-b$ 的值是多少?



(A)$\frac{1}{2}$　(B)4　(C)$-\frac{1}{2}$
(D)2　(E)-2

5. If $[(10^3)(10^x)]^2=10^{18}$, the value of x is
(A)$\sqrt{2}$　(B)12　(C)6
(D)1　(E)3

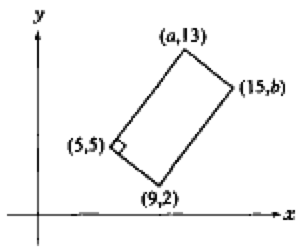
6. The sum of five consecutive integers is 75. The sum of the largest and smallest of these five integers is
(A)15　(B)25　(C)26
(D)30　(E)32

7. When a positive integer N is divided by 60, the remainder is 49. When N is divided by 15, the remainder is
(A)0　(B)3　(C)4
(D)5　(E)8

8. The 6 members of an executive committee want to call a meeting. Each of them phones 6 different people, who in turn each calls 6 other people. If no one is called more than once, how many people will know about the meeting?
(A)18　(B)36　(C)216
(D)252　(E)258

9. The sequences 3,20,37,54,71,… and 16,27,38,49,60,71,… each have 71 as a common term. The next term that these sequences have in common is
(A)115　(B)187　(C)258
(D)445　(E)1 006

10. In the rectangle shown, the value of $a-b$ is



(A) -3　　(B) -1　　(C) 0

(D) 3　　(E) 1

11. 一个小岛有$\frac{2}{5}$被森林覆盖，余下部分的$\frac{1}{4}$是沙丘。小岛有 90 公顷耕地。若小岛仅由森林、沙丘和耕地组成，问小岛的面积约为多少公顷？

(A) 163　　(B) 120　　(C) 200

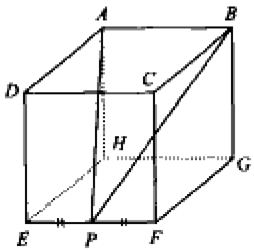
(D) 138　　(E) 257

12. 问有多少个整数 x 值满足$\frac{x-1}{3}<\frac{5}{7}<\frac{x+4}{5}$？

(A) 0　　(B) 1　　(C) 2

(D) 3　　(E) 4

13. 如图所示，$ABCDEFGH$ 是一个边长为 2 的正方体。P 是 EF 的中点。$\triangle APB$ 的面积。



(A) $\sqrt{8}$　　(B) 3　　(C) $\sqrt{32}$

(D) $\sqrt{2}$　　(E) 6

14. 问有多少个五位正整数可以被 9 除尽并且仅由数字 3 和 6 构成？

(A) 5　　(B) 2　　(C) 12

(D) 10　　(E) 8

15. 选 3 个数，每个数与其他两个数的平均值之和分别为 65, 69 和 76。原来 3 个数的平均值是多少？

(A) -3　　(B) -1　　(C) 0

(D) 3　　(E) 1

11. A small island has $\frac{2}{5}$ of its surface covered by forest and $\frac{1}{4}$ of the remainder of its surface by sand dunes. The island also has 90 hectares covered by farm land. If the island is made up of only forest, sand dunes and farm land, what is the total area of the island, to the nearest hectare?

(A) 163　　(B) 120　　(C) 200

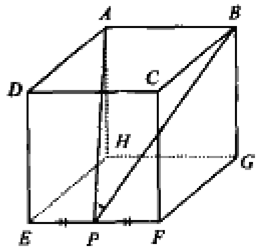
(D) 138　　(E) 257

12. How many integer values of x satisfy $\frac{x-1}{3}<\frac{5}{7}<\frac{x+4}{5}$?

(A) 0　　(B) 1　　(C) 2

(D) 3　　(E) 4

13. $ABCDEFGH$ is a cube having a side length of 2. P is the midpoint of EF, as shown. The area of $\triangle APB$ is



(A) $\sqrt{8}$　　(B) 3　　(C) $\sqrt{32}$

(D) $\sqrt{2}$　　(E) 6

14. How many five-digit positive integers, divisible by 9, can be written using only the digits 3 and 6?

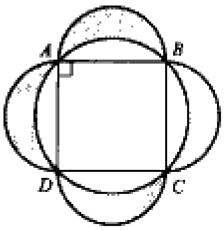
(A) 5　　(B) 2　　(C) 12

(D) 10　　(E) 8

15. Three different numbers are chosen such that when each of the numbers is added to the average of the remaining two, the numbers 65, 69 and 76 result. The average of the three original numbers is

(A)34　　(B)35　　(C)36
(D)37　　(E)38

16. 如图所示，边长为 2 的正方形 $ABCD$ 内接于一个圆中。用正方形的各边作直径，再画一个半圆。圆和半圆之间的阴影部分的面积是多少？



(A)π　　(B)4
(C)$2\pi-2$　　(D)$\pi+1$
(E)$2\pi-4$

17. P 点在直线 $y=5x+3$ 上，Q 点的坐标为 $(3,-2)$。若 M 点是线段 PQ 的中点，那么 M 点一定在下列哪条直线上？

(A)$y=\frac{5}{2}x-\frac{7}{2}$
(B)$y=5x+1$
(C)$y=-\frac{1}{5}x-\frac{7}{5}$
(D)$y=\frac{5}{2}x+\frac{1}{2}$
(E)$y=5x-7$

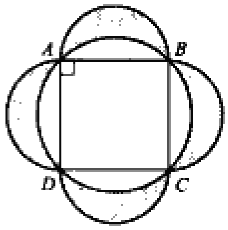
18. 一个圆的圆心坐标为 $A(5,3)$，半径为 12，另一个圆的圆心坐标为 $B(2,-1)$，半径为 6。问两个圆之间的最短距离是多少？

(A)1　　(B)2　　(C)3
(D)4　　(E)5

19. 如图 A 所示，一个装有水的密封瓶子由一个半径为 1 厘米的圆柱和一个半径为 3 厘米的圆柱构成。如横切面图 B 所示，当瓶子直立时，瓶内水的高度为 20 厘米。如图 C 所示，当瓶子倒立时水位高度为 28 厘米。问瓶子的高度是多少厘米？

(A)34　　(B)35　　(C)36
(D)37　　(E)38

16. Square $ABCD$ with side length 2 is inscribed in a circle, as shown. Using each side of the square as a diameter, semi-circular arcs are drawn. The area of the shaded region outside the circle and inside the semi-circles is



(A)π　　(B)4　　(C)$2\pi-2$
(D)$\pi+1$　　(E)$2\pi-4$

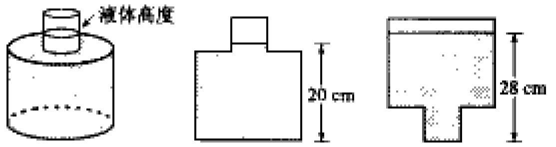
17. Point P is on the line $y=5x+3$. The coordinates of point Q are $(3,-2)$. If M is the midpoint of PQ, then M must lie on the line

(A)$y=\frac{5}{2}x-\frac{7}{2}$
(B)$y=5x+1$
(C)$y=-\frac{1}{5}x-\frac{7}{5}$
(D)$y=\frac{5}{2}x+\frac{1}{2}$
(E)$y=5x-7$

18. What is the shortest distance between two circles, the first having centre $A(5,3)$ and radius 12, and the other with centre $B(2,-1)$ and radius 6?

(A)1　　(B)2　　(C)3
(D)4　　(E)5

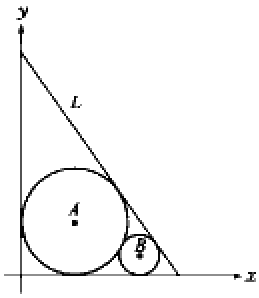
19. A sealed bottle, which contains water, has been constructed by attaching a cylinder of radius 1 cm to a cylinder of radius 3 cm, as shown in Figure A. When the bottle is right side up, the height of the water inside is 20 cm, as shown in the cross-section of the bottle in Figure B. When the bottle is upside down, the height of the liquid is 28 cm, as shown in Figure C. What is the total height, in cm, of the bottle?



图A 图B 图C

(A)29 (B)30 (C)31
(D)32 (E)48

20. 如图所示,以 A 为圆心、半径为 3 的圆与 x 轴和 y 轴相切。以 B 为圆心、半径为 1 的圆则与 x 轴和圆心为 A 的圆相切。直线 L 与两个圆相切。直线 L 在 y 轴上的截距是多少?



(A)$3+6\sqrt{3}$ (B)$10+3\sqrt{2}$
(C)$8+\sqrt{3}$ (D)$10+2\sqrt{3}$
(E)$9+3\sqrt{3}$

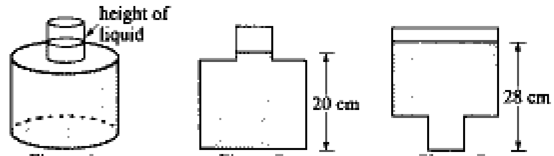
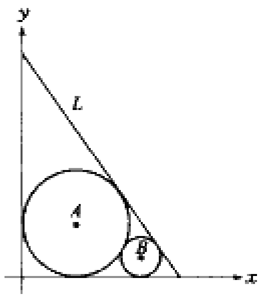


Figure A Figure B Figure C

(A)29 (B)30 (C)31
(D)32 (E)48

20. The circle with centre A has radius 3 and is tangent to both the positive x-axis and positive y-axis, as shown. Also, the circle with centre B has radius 1 and is tangent to both the positive x-axis and the circle with centre A. The line L is tangent to both circles. The y-intercept of line L is



(A)$3+6\sqrt{3}$ (B)$10+3\sqrt{2}$
(C)$8+\sqrt{3}$ (D)$10+2\sqrt{3}$
(E)$9+3\sqrt{3}$

试卷十五

Test 15

1. 计算 $2^{-2}\times2^{-1}\times2^{0}\times2^{1}\times2^{2}$ 的值。

   (A)4 (B)1 (C)0

   (D)$\frac{1}{4}$ (E)$\frac{1}{2}$

2. 若点$(-2,4)$在一条斜率为$\frac{1}{2}$的直线上，则直线在 y 轴上的截距是多少？

   (A)5 (B)-4 (C)3

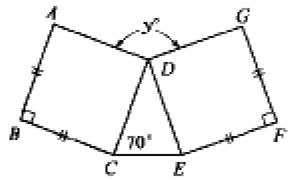
   (D)0 (E)8

3. 在三场篮球比赛之后，米高每场的平均得分是 18 分。在第四场比赛后，她的每场平均得分降到 17 分。问米高在第四场比赛中得了多少分？

   (A)18 (B)17 (C)16

   (D)15 (E)14

4. 图中 $ABCD$ 和 $DEFG$ 是两个边长相等的正方形，且$\angle DCE=70^\circ$。问 y 是多少度？



   (A)120° (B)160° (C)130°

   (D)110° (E)140°

5. 弗雷格将一个数减去 5，再除以 4。然后他将这个数先减去 4，再除以 5，两次计算的结果相同。原来这个数是多少？

1. The numerical value of $2^{-2}\times2^{-1}\times2^{0}\times2^{1}\times2^{2}$ is

   (A)4 (B)1 (C)0

   (D)$\frac{1}{4}$ (E)$\frac{1}{2}$

2. If the point $(-2,4)$ is on a line with slope $\frac{1}{2}$, then the y-intercept of this line is

   (A)5 (B)-4 (C)3

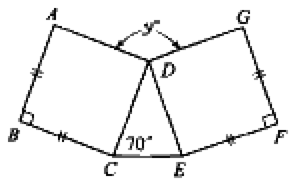
   (D)0 (E)8

3. After having played three basketball games, Megan had scored an average of 18 points per game. After her fourth game, her scoring average had dropped to 17 points per game. How many points did Megan score in her fourth game?

   (A)18 (B)17 (C)16

   (D)15 (E)14

4. In the diagram, $ABCD$ and $DEFG$ are squares with equal side lengths, and $\angle DCE=70^\circ$. The value of y is



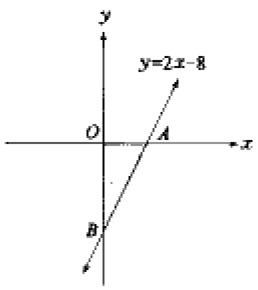
   (A)120° (B)160° (C)130°

   (D)110° (E)140°

5. Faruq subtracted 5 from a number and then divided by 4. Next, he subtracted 4 from the original number and then divided by 5. He got the same final answer both times. The original number was

(A)4　　(B)15　　(C)9
(D)20　　(E)−9

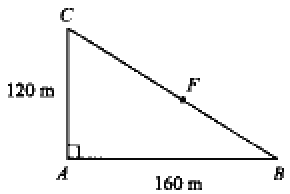
6. 图中，一条方程为 $y=2x-8$ 的直线与 x 轴在 A 点相交、与 y 轴在 B 点相交，计算 $\triangle AOB$ 的面积。



(A)8　　(B)16
(C)12　　(D)32
(E)4

7. 一张光盘的原价为 10.00 美元。若光盘的价格上涨 40%，然后这一新的价格又下跌 30%，问光盘的最终价格是多少？
(A)9.80 美元　(B)17.00 美元　(C)9.00 美元
(D)19.80 美元　(E)9.60 美元

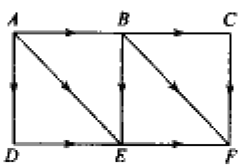
8. 图中，ABC 代表一条三角形的慢跑道。杰克沿着从 A 点到 B 点再到 F 点的路线慢跑。吉尔从 A 点慢跑到 C 点，再到 F 点。他们两人跑的距离相等。从 F 点到 B 点的距离是多少米？



(A)40　　(B)120　　(C)100
(D)80　　(E)200

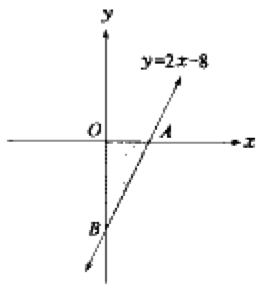
9. 若 $a(c+d)+b(c+d)=42$，且 $c+d=3$，问 $a+b+c+d$ 的值是多少？
(A)14　　(B)56　　(C)3
(D)17　　(E)39

10. 如图所示，只能沿着箭头所指的方向前进。从 A 到 F 有多少不同的路线？



(A)4　　(B)15　　(C)9
(D)20　　(E)−9

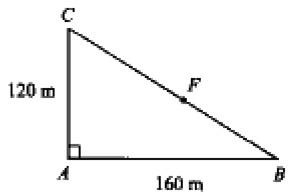
6. In the diagram, the line with equation $y=2x-8$ crosses the x-axis at A and the y-axis at B. The area of $\triangle AOB$ is



(A)8　　(B)16
(C)12　　(D)32
(E)4

7. A compact disc originally sells for \$10.00. If the price of the compact disc is increased by 40% and this new price is later decreased by 30%, what is the final price?
(A) \$9.80　(B) \$17.00　(C) \$9.00
(D) \$19.80　(E) \$9.60

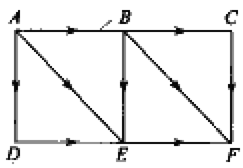
8. In the diagram, ABC represents a triangular jogging path. Jack jogs along the path from A to B to F. Jill jogs from A to C to F. Each jogs the same distance. The distance from F to B, in metres, is



(A)40　　(B)120　　(C)100
(D)80　　(E)200

9. If $a(c+d)+b(c+d)=42$ and $c+d=3$, what is the value of $a+b+c+d$?
(A)14　　(B)56　　(C)3
(D)17　　(E)39

10. In the grid shown, it is only possible to travel along an edge in the direction indicated by the arrow. The number

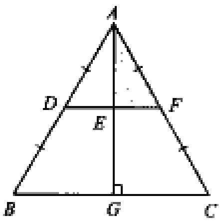


(A)9　　(B)5　　(C)3
(D)6　　(E)4

11. 若 4 个连续正整数的乘积是 358 800,则这 4 个数的和是多少?
(A)102　　(B)98　　(C)94
(D)90　　(E)106

12. "双-单"数是一个三位数,前两位数相同,但与第三位数不同。例如,553 是一个"双-单"数。问在 100 到 1 000 之间有多少个"双-单"数?
(A)81　　(B)18　　(C)72
(D)64　　(E)90

13. 图中,$\triangle ABC$ 是一个等腰三角形,$AB=AC$。$AG\perp BC$,D 是 AB 的中点,F 是 AC 的中点,E 是 DF 与 AG 的交点。问阴影部分的面积是 $\triangle ABC$ 面积的几分之几?



(A)$\frac{1}{12}$　　(B)$\frac{1}{6}$　　(C)$\frac{1}{4}$
(D)$\frac{1}{10}$　　(E)$\frac{1}{8}$

14. $777\,777\,777\,777\,777^2-222\,222\,222\,222\,223^2$ 的值的各位数之和是多少?
(A)148　　(B)84　　(C)74
(D)69　　(E)79

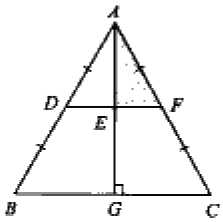
15. 两个圆柱形水箱紧挨着放置在同一水平面上。一个水箱的半径是 4 米,高为 10 米,并且盛满了水。另一个水箱的半径是 6 米,高为 8 米,并且是空的。将一个水箱里的水抽到另一个水箱中,直至两个水箱的水位相等。这时两个水箱

of different paths from A to F is
(A)9　　(B)5　　(C)3
(D)6　　(E)4

11. If the product of four consecutive positive integers is 358 800, then the sum of these four integers is
(A)102　　(B)98　　(C)94
(D)90　　(E)106

12. A "double-single" number is a three-digit number made up of two identical digits followed by a different digit. For example, 553 is a double-single number. How many double-single numbers are there between 100 and 1 000?
(A)81　　(B)18　　(C)72
(D)64　　(E)90

13. In the diagram, triangle ABC is isosceles with $AB=AC$, and AG is perpendicular to BC. Point D is the midpoint of AB, point F is the midpoint of AC, and E is the point of intersection of DF and AG. What fraction of the area of $\triangle ABC$ does the shaded area represent?



(A)$\frac{1}{12}$　　(B)$\frac{1}{6}$　　(C)$\frac{1}{4}$
(D)$\frac{1}{10}$　　(E)$\frac{1}{8}$

14. The sum of the digits of the integer equal to $777\,777\,777\,777\,777^2-222\,222\,222\,222\,223^2$ is
(A)148　　(B)84　　(C)74
(D)69　　(E)79

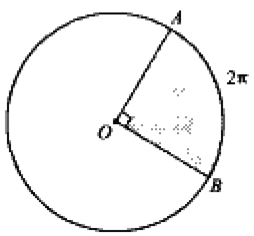
15. Two cylindrical tanks sit side by side on a level surface. The first tank has a radius of 4 metres, a height of 10 metres, and is full of water. The second tank has a radius of 6 metres, a height of 8 metres, and is empty. Water is pumped from

中的水深多少米？

(A)4　　(B)5　　(C)$\frac{46}{15}$

(D)$\frac{52}{17}$　　(E)$\frac{40}{13}$

16. 图中，圆心为 O 点。扇形阴影 AOB 的角度为 90°，AB 的弧长为 2π 个单位。扇形 AOB 的面积是多少？



(A)4π　　(B)16π

(C)6π　　(D)24π

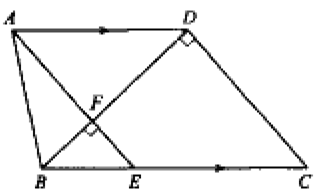
(E)8π

17. 有多少种方法可以将 75 表示为 2 个或更多个连续正整数的和？

(A)1　　(B)2　　(C)3

(D)4　　(E)5

18. 在梯形 $ABCD$ 中，$AD /\!/ BC$，$BD \perp DC$。从 BD 上取一点 F 使 $AF \perp BD$。AF 延长与 BC 相交于 E 点。若 $AB=41$，$AD=50$，$BF=9$，问四边形 $FECD$ 的面积是多少？



(A)900　　(B)1 523.5　　(C)960

(D)1 560　　(E)1 300

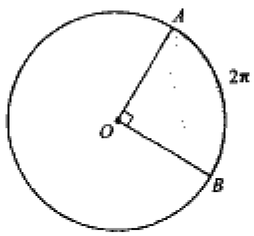
19. 如图所示，一个圆柱体的直径是 27，高是 30。圆柱体中放有两个铅球，半径分别为 6 和 9，大铅球放在圆柱体的底面上。将水倒入圆柱体中，并且正好没过两个球。所需水的体积

the first tank to the second until the depth of water in both tanks is the same. The depth of water in each tank, in metres, is

(A)4　　(B)5　　(C)$\frac{46}{15}$

(D)$\frac{52}{17}$　　(E)$\frac{40}{13}$

16. In the diagram, the circle has centre O. The shaded sector AOB has sector angle 90°, and AB has arc length 2π units. The area of sector AOB is



(A)4π　　(B)16π　　(C)6π

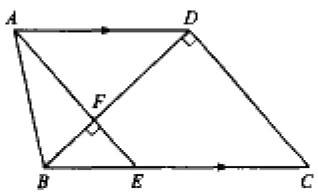
(D)24π　　(E)8π

17. In how many ways can 75 be expressed as the sum of two or more consecutive positive integers?

(A)1　　(B)2　　(C)3

(D)4　　(E)5

18. In trapezoid $ABCD$, AD is parallel to BC. Also, BD is perpendicular to DC. The point F is chosen on line BD so that AF is perpendicular to BD. AF is extended to meet BC at point E. If $AB=41$, $AD=50$ and $BF=9$, what is the area of quadrilateral $FECD$?



(A)900　　(B)1 523.5　　(C)960

(D)1 560　　(E)1 300

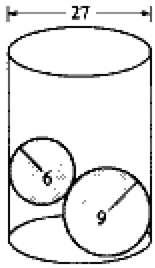
19. A cylinder, which has a diameter of 27 and a height of 30, contains two lead spheres with radii 6 and 9, with the larger sphere sitting on the bottom of the cylinder, as shown. Water is poured

是多少？

(A)3 672π　(B)3 660π

(C)3 375π　(D)3 114π

(E)4 374π

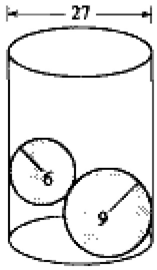


into the cylinder so that it just covers both spheres. The volume of water required is

(A)3 672π　(B)3 660π

(C)3 375π　(D)3 114π

(E)4 374π



20. 点阵上一点的坐标为(x,y)，x 和 y 都是整数。问有多少个 k 值使两条直线 $kx-5y+7=0$ 和 $k^2x-5y+1=0$ 在点阵上的这一点相交？

(A)1　(B)2　(C)3

(D)4　(E)5

20. A lattice point is a point (x,y) where both x and y are integers. For how many different integer values of k will the two lines $kx-5y+7=0$ and $k^2x-5y+1=0$ intersect at a lattice point?

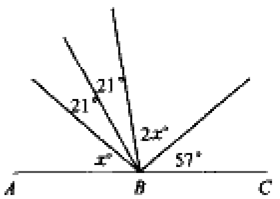
(A)1　(B)2　(C)3

(D)4　(E)5

试卷十六

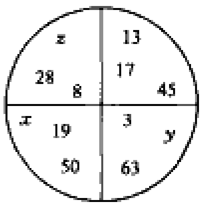
Test 16

1. 图中 ABC 是一条直线。x 为多少度?



(A)27°　　(B)33°　　(C)24°
(D)87°　　(E)81°

2. 图中,每个四分之一圆中的各个数字之和相等。$x+y+z$ 等于多少?



(A)75　　(B)64
(C)54　　(D)171
(E)300

3. 一等边三角形的边长为 20。若一个正方形的周长与这个三角形的周长相同,则正方形的面积是多少?

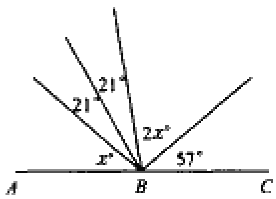
(A)25　　(B)400　　(C)225
(D)60　　(E)100

4. 若 $\dfrac{1}{x+\dfrac{1}{5}}=\dfrac{5}{3}$,则 x 等于多少?

(A)$\frac{2}{5}$　　(B)$\frac{4}{5}$　　(C)$\frac{1}{5}$
(D)$-\frac{2}{5}$　　(E)$-\frac{22}{5}$

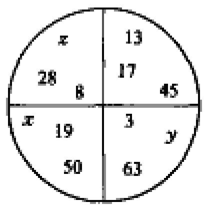
5. 有两个女孩和六个男孩在一起玩游戏,问还需要多少个女孩参加,才能使女孩人数为总人数的 $\frac{5}{8}$?

1. In the diagram, ABC is a straight line. The value of x is



(A)27°　　(B)33°　　(C)24°
(D)87°　　(E)81°

2. In the diagram, the sum of the numbers in each quarter circle is the same. The value of $x+y+z$ is



(A)75　　(B)64
(C)54　　(D)171
(E)300

3. An equilateral triangle has a side length of 20. If a square has the same perimeter as this triangle, the area of the square is

(A)25　　(B)400　　(C)225
(D)60　　(E)100

4. If $\dfrac{1}{x+\dfrac{1}{5}}=\dfrac{5}{3}$, then x equals

(A)$\frac{2}{5}$　　(B)$\frac{4}{5}$　　(C)$\frac{1}{5}$
(D)$-\frac{2}{5}$　　(E)$-\frac{22}{5}$

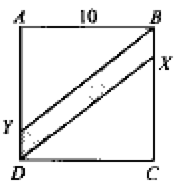
5. There are 2 girls and 6 boys playing a game. How many additional girls must join the game so that $\frac{5}{8}$

(A)6　　(B)3　　(C)5
(D)8　　(E)7

6. 设 $N = 10^3 + 10^4 + 10^5 + 10^6 + 10^7 + 10^8 + 10^9$，问 N 各位数的和是多少？
(A)12　　(B)1　　(C)6
(D)9　　(E)7

7. 点 $A(a,1)$，$B(9,0)$ 和 $C(-3,4)$ 都在一条直线上，a 的值是多少？
(A)3　　(B)$\frac{8}{3}$　　(C)$\frac{7}{2}$
(D)6　　(E)$\frac{5}{2}$

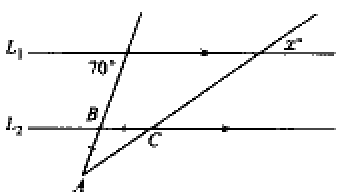
8. 图中，正方形 $ABCD$ 的边长为 10，若 $AY = CX = 8$，阴影部分的面积是多少？



(A)16　　(B)20
(C)40　　(D)48
(E)24

9. 卡尔走 3 步的距离等于吉米走 4 步的距离。卡尔的每步为 0.5 米。问吉米走 24 步是多少米？
(A)16　　(B)9　　(C)36
(D)12　　(E)18

10. 图中，直线 L_1 平行于直线 L_2，并且 $BA = BC$。x 为多少度？



(A)35　　(B)30　　(C)37.5
(D)45　　(E)40

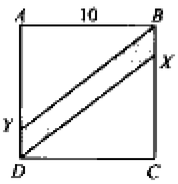
11. 计算 $\frac{(4^{2\,003}) \times (3^{2\,002})}{(6^{2\,002}) \times (2^{2\,003})}$ 的值。

of the players are girsl?
(A)6　　(B)3　　(C)5
(D)8　　(E)7

6. Let $N = 10^3 + 10^4 + 10^5 + 10^6 + 10^7 + 10^8 + 10^9$. The sum of the digits of N is
(A)12　　(B)1　　(C)6
(D)9　　(E)7

7. The points $A(a,1)$, $B(9,0)$ and $C(-3,4)$ lie on a straight line. The value of a is
(A)3　　(B)$\frac{8}{3}$　　(C)$\frac{7}{2}$
(D)6　　(E)$\frac{5}{2}$

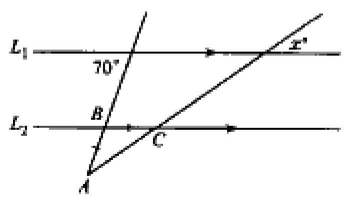
8. In the diagram, $ABCD$ is a square with a side length of 10. If $AY = CX = 8$, the area of the shaded region is



(A)16　　(B)20
(C)40　　(D)48
(E)24

9. Carly takes three steps to walk the same distance as Jim walks in four steps. Each of Carly's steps covers 0.5 metres. How many metres does Jim travel in 24 steps?
(A)16　　(B)9　　(C)36
(D)12　　(E)18

10. In the diagram, line L_1 is parallel to line L_2 and $BA = BC$. The value of x is



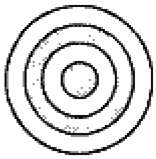
(A)35　　(B)30　　(C)37.5
(D)45　　(E)40

11. The value of $\frac{(4^{2\,003}) \times (3^{2\,002})}{(6^{2\,002}) \times (2^{2\,003})}$ is

(A)1　　(B)2　　(C)12

(D)4　　(E)$\frac{1}{2}$

12. 图中的 4 个圆同心,半径分别为 1,2,3,4。阴影部分面积与大圆面积的比是多少?



(A)5:8　　(B)1:4

(C)7:16　　(D)1:2

(E)3:8

13. 若 $496=2^m-2^n$, m、n 均为整数,则 $m+n$ 等于多少?

(A)13　　(B)9　　(C)4

(D)14　　(E)5

14. 一个四位数的各位数之乘积为 810。若四位数中没有重复的数字,问各位数之和是多少?

(A)18　　(B)19　　(C)23

(D)25　　(E)22

15. 一辆汽车行驶 100 千米需 8.4 升的汽油。一名机械师可以花费 400 美元将发动机的耗油量降到每 100 千米 6.3 升。若汽油的价格为每升 0.80 美元,问汽车至少行驶多少千米才能弥补这 400 美元?

(A)10 000 至 14 000

(B)14 000 至 18 000

(C)18 000 至 22 000

(D)22 000 至 26 000

(E)26 000 至 30 000

16. 朱莉和丹尼尔在一个圆形跑道上恒速向相反的方向跑步。朱莉每 56 秒跑完一圈,并且每 24 秒与丹尼尔相遇一次。问丹尼尔跑完一圈需要多少秒钟?

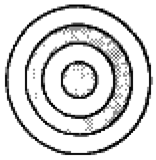
(A)32　　(B)36　　(C)40

(D)48　　(E)42

(A)1　　(B)2　　(C)12

(D)4　　(E)$\frac{1}{2}$

12. In the diagram, the four circles have a common centre, and have radii of 1, 2, 3 and 4. The ratio of the area of the shaded regions to the area of the largest circle is



(A)5:8　　(B)1:4　　(C)7:16

(D)1:2　　(E)3:8

13. If $496=2^m-2^n$, where m and n are integers, then $m+n$ is equal to

(A)13　　(B)9　　(C)4

(D)14　　(E)5

14. The product of the digits of a four-digit number is 810. If none of the digits is repeated, the sum of the digits is

(A)18　　(B)19　　(C)23

(D)25　　(E)22

15. A car uses 8.4 litres of gas for every 100 km it is driven. A mechanic is able to modify the car's engine at a cost of \$400 so that it will only use 6.3 litres of gas per 100 km. If gas costs \$0.80 per litre, this distance, in kilometres, is between

(A)10 000 and 14 000

(B)14 000 and 18 000

(C)18 000 and 22 000

(D)22 000 and 26 000

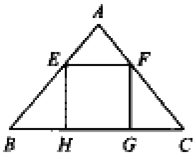
(E)26 000 and 30 000

16. Troye and Daniella are running at constant speeds in opposite directions around a circular track. Troye completes one lap every 56 seconds and meets Daniella every 24 seconds. How many seconds does it take Daniella to complete one lap?

(A)32　　(B)36　　(C)40

(D)48　　(E)42

17. 如图所示，等腰$\triangle ABC$有$AB=AC$，$BC=30$厘米。正方形$EFGH$的边长为12厘米，并且内接于$\triangle ABC$。$\triangle AEF$的面积是多少平方厘米？

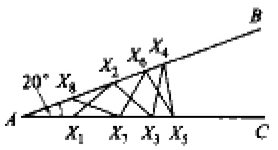


(A)27　　(B)54　　(C)51
(D)48　　(E)60

18. 一个金字塔的正方形底的面积为1 440平方厘米。金字塔的每个三角形面都相同，面积均为840平方厘米。金字塔的高是多少厘米？
(A)$30\sqrt{2}$　　(B)40　　(C)$20\sqrt{6}$
(D)$20\sqrt{3}$　　(E)30

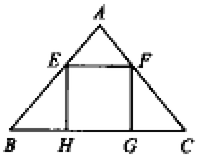
19. 有多少种方法可以从数组$\{0,1,2,\cdots,9\}$中取出a,b,c,d，使$a<b<c<d$，并且$a+b+c+d$是3的倍数？
(A)54　　(B)64　　(C)63
(D)90　　(E)72

20. $\angle BAC$各边上的交点$X_1,X_2,\cdots,X_{2n}$满足下列条件，$\angle BAC$即可认为是“可以系上”：
1. X_{2k-1}对于任何k值都在AC上；
2. X_{2k}对于任何k值都在AB上；
3. $AX_1=X_1X_2=X_2X_3=\cdots=X_{2n-1}X_{2n}=X_{2n}A$。
例如，图中所示的20°角就是可以系上的。问可以系上的角度为整数的锐角一共有多少个？



(A)3　　(B)4　　(C)5
(D)6　　(E)7

17. In the diagram, $\triangle ABC$ is isosceles with $AB=AC$ and $BC=30$ cm. Square $EFGH$, which has a side length of 12 cm, is inscribed in $\triangle ABC$, as shown. The area of $\triangle AEF$, in cm^2, is



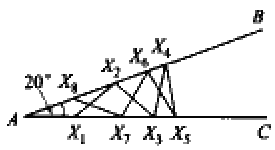
(A)27　　(B)54　　(C)51
(D)48　　(E)60

18. A pyramid has a square base which has an area of 1 440 cm^2. Each of the pyramid's triangular faces is identical and each has an area of 840 cm^2. The height of the pyramid, in cm, is
(A)$30\sqrt{2}$　　(B)40　　(C)$20\sqrt{6}$
(D)$20\sqrt{3}$　　(E)30

19. In how many ways can a, b, c and d be chosen from the set $\{0,1,2,\cdots,9\}$ so that $a<b<c<d$ and $a+b+c+d$ is a multiple of three?
(A)54　　(B)64　　(C)63
(D)90　　(E)72

20. $\angle BAC$ is said to be "laceable" if distinct points $X_1, X_2, \cdots, X_{2n}$ can be found so that
- X_{2k-1} is on AC for each value of k,
- X_{2k} is on AB for each value of k, and
- $AX_1=X_1X_2=X_2X_3=\cdots=X_{2n-1}X_{2n}=X_{2n}A$.

For example, the angle 20° is laceable, as shown. The number of laceable acute angles, whose sizes in degrees are integers, is

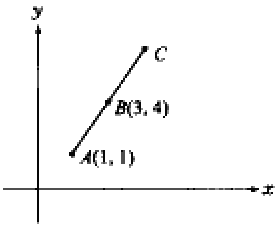


(A)3　　(B)4　　(C)5
(D)6　　(E)7

试卷十七

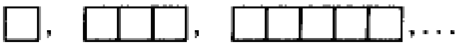
Test 17

1. 点 $B(3,4)$ 是线段 AC 的中点。A 点的坐标为 $(1,1)$，C 点的坐标是下列哪一对数值？



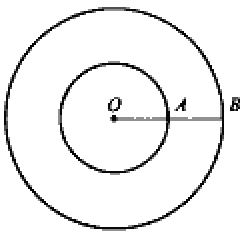
(A)(2,3)　(B)(2,2)　(C)(4,6)
(D)(5,8)　(E)(5,7)

2. 以下序列的每一个图形都是由边长为 1 的小正方块构成。问序列第 5 个图形的外周长是多少？



(A)9　(B)18　(C)20
(D)24　(E)36

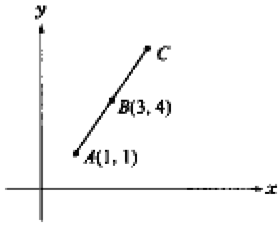
3. 图中，O 为每个圆的圆心，两个圆的周长分别为 24π 和 14π。B 点是外圆上的一点，OB 与内圆相交于 A 点。AB 的长度是多少？



(A) $\sqrt{10}$　(B)5
(C)7　(D)10π
(E)3

4. 如图所示，两个竖直的塔 AB 和 CD 在平地上相距 16 米，塔 AB 18 米高，塔 CD 30 米高。从 A 到

1. Point $B(3,4)$ is the midpoint of the line segment joining the points $A(1,1)$ and C. The coordinates of C are



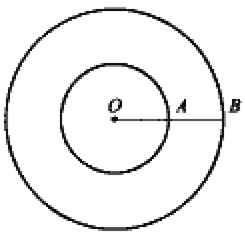
(A)(2,3)　(B)(2,2)　(C)(4,6)
(D)(5,8)　(E)(5,7)

2. In the sequence, each figure is made up of small squares of side length 1. What is the outer perimeter of the fifth figure in the sequence?



(A)9　(B)18　(C)20
(D)24　(E)36

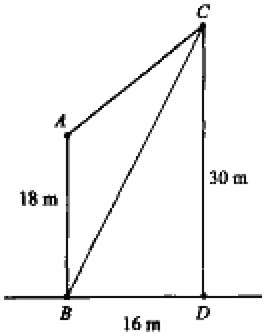
3. In the diagram, O is the centre of each circle. The circumferences of the circles are 24π and 14π. B is a point on the outer circle and OB intersects the inner circle at A. The length of AB is



(A) $\sqrt{10}$　(B)5　(C)7
(D)10π　(E)3

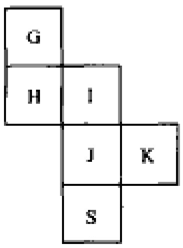
4. Two vertical towers, AB and CD, are located 16 m apart on flat ground, as shown. Tower AB is 18

C 和从 B 到 C 都系有绳索。假设绳索是系紧的，绳索的总长度是多少米？



(A)54　　(B)64　　(C)44
(D)48　　(E)59

5. 若用所示的图形折成一个正方体，问与 G 相对的是哪一个字母？



(A)S　　(B)H
(C)I　　(D)J
(E)K

6. 在 x，_，3，_，18 五个数组成的数列中，从第三个数开始，每个数是前面两个数的乘积。x 的值是多少？

(A)$\frac{2}{3}$　　(B)$\frac{3}{2}$　　(C)1
(D) -9　　(E) -1

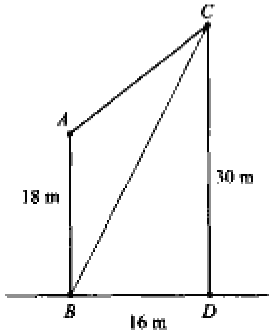
7. 在魔力方格中，各行、各列及对角线方向上的数字之和均相等，每行中 3 个数字的和是多少？

$2x$	3	2
		-3
0	x	

(A)0　　(B)1
(C)3　　(D)7
(E)9

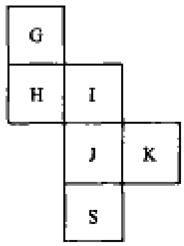
8. 图中所示的小正方形位于大正方形中。小正方形的周长为 72 厘米，阴影部分的面积为 160 平方厘米。大正方形的周长是多少厘米？

m tall and tower CD is 30 m tall. Ropes are tied from A to C and from B to C. Assuming the ropes are taut, the total length of rope, in m, is



(A)54　　(B)64　　(C)44
(D)48　　(E)59

5. If the figure shown is folded to make a cube, what letter is opposite G?



(A)S　　(B)H
(C)I　　(D)J
(E)K

6. In the sequence of five numbers x, ____, 3, ____, 18, each number after the second is obtained by multiplying the two previous numbers. The value of x is

(A)$\frac{2}{3}$　　(B)$\frac{3}{2}$　　(C)1
(D) -9　　(E) -1

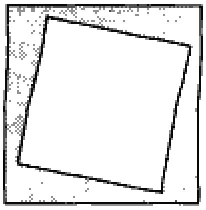
7. In the magic square, the sum of the three numbers in any row, column or diagonal is the same. The sum of the three numbers in any row is

$2x$	3	2
		-3
0	x	

(A)0　　(B)1　　(C)3
(D)7　　(E)9

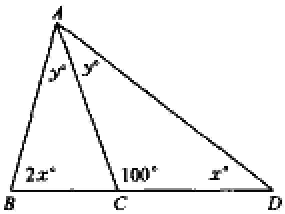
8. In the diagram, a smaller square lies inside a larger square. The perimeter of the smaller square is 72 cm. The shaded area is 160 cm^2. The perimeter of the larger square, in cm, is

(A)58　(B)88
(C)116　(D)121
(E)112



9. 若 x 和 y 是两个正整数,4,20 和 x 的平均值等于 y 和 16 的平均值,则 $x:y$ 等于多少?
(A)3:2　(B)2:3　(C)1:1
(D)2:5　(E)5:2

10. 图中,B、C、D 在一条直线上,$\angle ACD=100°$,$\angle ADB=x°$,$\angle ABD=2x°$,$\angle DAC=\angle BAC=y°$。x 是多少度?



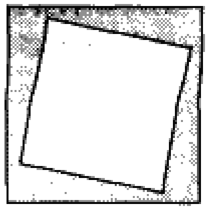
(A)10　(B)45　(C)30
(D)50　(E)20

11. 在掷骰子游戏中,一个人一次掷了两个骰子。他的得分是两个骰子中较大的一个数,例如,若他掷到 3 和 5,则得到 5 分。若他掷到 4 和 4,他得 4 分。问他得到 3 分或小于 3 分的概率是多少?
(A)$\frac{1}{4}$　(B)$\frac{7}{36}$　(C)$\frac{5}{36}$
(D)$\frac{1}{3}$　(E)$\frac{2}{9}$

12. 两个数 m 和 n 满足 $m+n=20$,$\frac{1}{m}+\frac{1}{n}=\frac{5}{24}$。$mn$ 的乘积是多少?
(A)72　(B)36　(C)48
(D)96　(E)24

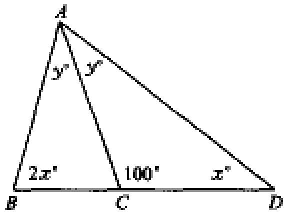
13. 图中,$ABCDEFGH$ 为一个正方体,边长为 12 厘米。一只蚂蚁在顶角 A 上,它只能沿着正方体

(A)58　(B)88
(C)116　(D)121
(E)112



9. If x and y are positive numbers and the average of 4,20 and x is equal to the average of y and 16, then the ratio $x:y$ is
(A)3:2　(B)2:3　(C)1:1
(D)2:5　(E)5:2

10. In the diagram, B, C and Dlie on a straight line, with $\angle ACD=100°$, $\angle ADB=x°$, $\angle ABD=2x°$, and $\angle DAC=\angle BAC=y°$. The value of x is



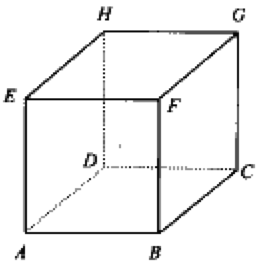
(A)10　(B)45　(C)30
(D)50　(E)20

11. In a dice game, a player rolls two dice. His score is the larger of the two numbers on the dice. For example, if he rolls 3 and 5, his score is 5, and if he rolls 4 and 4, his score is 4. What is the probability that his score is 3 or less?
(A)$\frac{1}{4}$　(B)$\frac{7}{36}$　(C)$\frac{5}{36}$
(D)$\frac{1}{3}$　(E)$\frac{2}{9}$

12. The two whole numbers m and n satisfy $m+n=20$ and $\frac{1}{m}+\frac{1}{n}=\frac{5}{24}$. The product mn is equal to
(A)72　(B)36　(C)48
(D)96　(E)24

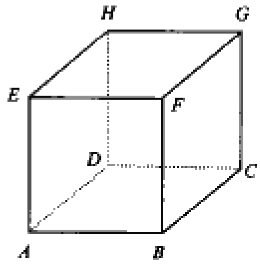
13. In the diagram, $ABCDEFGH$ is a cube with an edge length of 12 cm. An ant sits on the cube at

的边爬行，并且每条边只能经过一次。问蚂蚁最多能爬行多少厘米？



(A)96 cm (B)144 cm (C)84 cm
(D)108 cm (E)132 cm

vertex A. The ant can only walk along the edges of the cube, and cannot walk along any edge more than once. What is the greatest distance that the ant can walk before it cannot continue?



(A)96 cm (B)144 cm (C)84 cm
(D)108 cm (E)132 cm

14. 计算$\frac{1}{2}+\frac{2^1}{2^2}+\frac{2^2}{2^3}+\cdots+\frac{2^{2002}}{2^{2003}}+\frac{2^{2003}}{2^{2004}}$的值。

(A)1 002 (B)501 (C)$\frac{1}{2^{2004}}$

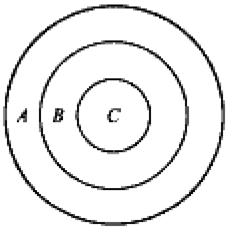
(D)2 004 (E)$\frac{2004}{2^{2004}}$

14. $\frac{1}{2}+\frac{2^1}{2^2}+\frac{2^2}{2^3}+\cdots+\frac{2^{2002}}{2^{2003}}+\frac{2^{2003}}{2^{2004}}$ is equal to

(A)1 002 (B)501 (C)$\frac{1}{2^{2004}}$

(D)2 004 (E)$\frac{2004}{2^{2004}}$

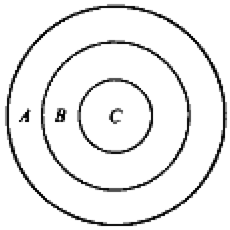
15. 一个镖靶有三个区域。击中各区域的得分也不相同。三个投手每人各投两镖，得分记录如下：



第一个投手：击中 C 区和 A 区各一次，总计 15 分，
第二个投手：击中 C 区和 B 区各一次，总计 18 分，
第三个投手：击中 B 区和 A 区各一次，总计 13 分。
若第四个投手击中 B 区两次，问她可得多少分？

(A)10 (B)14 (C)16
(D)18 (E)20

15. An archery target has 3 regions, each worth a different value if it is hit. Three archers shoot two arrows each and record scores as follows:



First archer: 1 arrow in C and 1 arrow in A for a score of 15 points,
Second archer: 1 arrow in C and 1 arrow in B for a score of 18 points,
Third archer: 1 arrow in B and 1 arrow in A for a score of 13 points,
If a fourth archer shoots 2 arrows into ring B, her score is

(A)10 (B)14 (C)16
(D)18 (E)20

16. 在一包建筑用纸板中，蓝色和红色纸板原来的数量比例为 2:7。劳拉每天用 1 张蓝色板和 3 张红色板。一天她用了 3 张红色板和最后 1 张

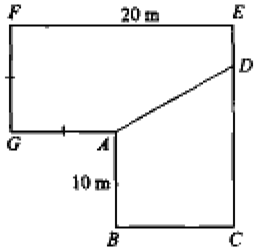
16. In a pack of construction paper, the numbers of *blue and red sheets are originally in the ratio* 2:7. Each day, Laura uses 1 blue sheet and 3 red

蓝色板,并且余下了15张红色板。问原来那一包建筑用纸板一共有多少张?

(A)144　(B)252　(C)135

(D)270　(E)105

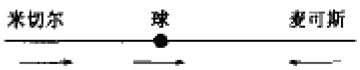
17. 图中,$ABCDEFG$ 是一个房间,每个角都为直角,$EF=20$ 米,$AB=10$ 米,$AG=GF$。房间的总面积是280平方米。从 A 到 D 砌一面墙将房间分为两个相等的面积。问 CD 有多少米长?



(A)15　(B)$\frac{50}{3}$　(C)12

(D)13　(E)$\frac{40}{3}$

18. 一个足球以每秒4米的速度以直线方向从米切尔向麦可斯滚去。在球距离米切尔15米时,米切尔以每秒9米的速度开始追赶球。麦可斯这时距离球30米,也开始以每秒8米的速度向球跑过去。当一个人先触到球时问两人相距约多远?



(A)2.00米　(B)2.25米　(C)2.50米

(D)2.75米　(E)3.00米

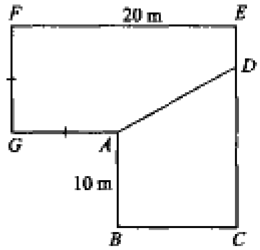
19. 如图所示,4个相同的等腰三角形 AWB,BXC,CYD 和 DZE 排成一排,点 A,B,C,D,E 在同一条直线上,用与 AX、AY 和 AZ 相同长度的边构成一个新的三角形。若 $AZ=AE$,问当新三角形的面积小于2 004时,x 可能的最大整数值是多少?

sheets. One day, she uses 3 red sheets and the last blue sheet, leaving her with 15 red sheets. How many sheets of construction paper were in the pack originally?

(A)144　(B)252　(C)135

(D)270　(E)105

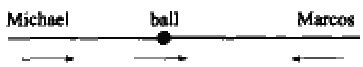
17. In the diagram, $ABCDEFG$ is a room having square corners, with $EF=20$ m, $AB=10$ m, and $AG=GF$. The total area of the room is 280 m^2. A wall is built from A to D creating two rooms of equal area. What is the distance, in metres, from C to D?



(A)15　(B)$\frac{50}{3}$　(C)12

(D)13　(E)$\frac{40}{3}$

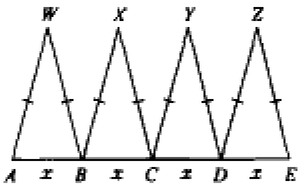
18. A soccer ball rolls at 4 m/s towards Marcos in a direct line from Michael. The ball is 15 m ahead of Michael who is chasing it at 9 m/s. Marcos is 30 m away from the ball and is running towards it at 8 m/s. The distance between Michael and Marcos when the ball is touched for the first time by one of them is closest to



(A)2.00 m　(B)2.25 m　(C)2.50 m

(D)2.75 m　(E)3.00 m

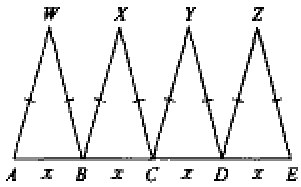
19. Four identical isosceles triangles AWB, BXC, CYD, and DZE are arranged, as shown, with points A, B, C, D, and E lying on the same straight line. A new triangle is formed with sides the same lengths as AX, AY and AZ. If $AZ=AE$, the largest integer value of x such that the area of this new triangle is less than 2 004 is



(A)18　　(B)19　　(C)20
(D)21　　(E)22

20. 一系列表达式分别为$\frac{7x+1}{2}$，$\frac{7x+2}{3}$，$\frac{7x+3}{4}$，…，$\frac{7x+300}{301}$。小于或等于 60 并且使上述各表达式都不能约分的 x 一共有多少个不同的正整数值？

(A)1　　(B)2　　(C)3
(D)4　　(E)5



(A)18　　(B)19　　(C)20
(D)21　　(E)22

20. The number of positive integers x with $x \leqslant 60$ such that each of the rational expressions

$$\frac{7x+1}{2}, \frac{7x+2}{3}, \frac{7x+3}{4}, \cdots, \frac{7x+300}{301}$$

is in lowest terms (i. e. in each expression, the numerator and denominator have no common factors) is

(A)1　　(B)2　　(C)3
(D)4　　(E)5

第一部分 试题参考答案

试卷一	试卷二	试卷三	试卷四	试卷五	试卷六	试卷七	试卷八	试卷九
1.D	1.C	1.A	1.B	1.D	1.A	1.C	1.A	1.E
2.D	2.D	2.C	2.D	2.D	2.E	2.D	2.C	2.A
3.D	3.A	3.C	3.C	3.A	3.C	3.B	3.E	3.D
4.B	4.D	4.D	4.C	4.A	4.A	4.B	4.D	4.D
5.C	5.A	5.B	5.E	5.B	5.E	5.B	5.B	5.C
6.A	6.D	6.B	6.D	6.B	6.A	6.A	6.D	6.C
7.C	7.B	7.B	7.C	7.D	7.C	7.B	7.E	7.D
8.D	8.D	8.E	8.D	8.A	8.B	8.C	8.C	8.D
9.E	9.C	9.B	9.A	9.E	9.E	9.D	9.D	9.B
10.B	10.D	10.B	10.D	10.C	10.E	10.B	10.C	10.E
11.C	11.D	11.B	11.C	11.D	11.D	11.A	11.E	11.B
12.E	12.A	12.D	12.D	12.A	12.A	12.D	12.C	12.E
13.A	13.B	13.C	13.C	13.C	13.A	13.B	13.D	13.C
14.C	14.B	14.B	14.D	14.A	14.D	14.C	14.B	14.C
15.E	15.B	15.A	15.B	15.D	15.D	15.B	15.C	15.E
16.A	16.A	16.D	16.D	16.D	16.C	16.E	16.D	16.A
17.C	17.B	17.B	17.D	17.B	17.C	17.C	17.D	17.B
18.C	18.D	18.B	18.B	18.D	18.D	18.C	18.E	18.D
19.C	19.D	19.C	19.D	19.D	19.C	19.E	19.E	19.C
20.E	20.C	20.C	20.B	20.C	20.B	20.E	20.C	20.C

试卷十	试卷十一	试卷十二	试卷十三	试卷十四	试卷十五	试卷十六	试卷十七
1.B	1.B	1.E	1.B	1.E	1.D	1.E	1.C
2.D	2.D	2.C	2.D	2.C	2.D	2.A	2.A
3.C	3.A	3.E	3.C	3.D	3.E	3.C	3.E
4.E	4.C	4.E	4.A	4.B	4.C	4.E	4.E
5.E	5.C	5.B	5.A	5.E	5.B	5.A	5.E
6.D	6.E	6.A	6.C	6.A	6.A	6.D	6.D
7.C	7.E	7.A	7.A	7.A	7.B	7.B	7.A
8.C	8.D	8.C	8.C	8.B	8.B	8.D	8.E
9.D	9.B	9.D	9.B	9.D	9.C	9.B	9.A
10.D	10.E	10.B	10.C	10.B	10.A	10.A	10.C
11.B	11.A	11.E	11.A	11.C	11.D	11.C	11.D
12.A	12.C	12.C	12.D	12.C	12.A	12.C	12.B
13.B	13.E	13.C	13.A	13.D	13.C	13.B	13.A
14.B	14.A	14.B	14.B	14.E	14.A	14.A	14.C
15.B	15.B	15.A	15.B	15.E	15.E	15.E	15.D
16.D	16.B	16.D	16.E	16.A	16.B	16.D	16.B
17.E	17.C	17.D	17.D	17.D	17.C	17.D	17.C
18.C	18.D	18.B	18.C	18.E	18.D	18.E	18.C
19.C	19.C	19.C	19.D	19.C	19.A	19.D	19.D
20.D	20.C	20.C	20.E	20.B	20.E	20.B	20.B

第一部分　试题讲解

Solutions of partial questions

试卷十一第 14 题：

解：

若朱安赢了 3 盘，玛丽则会失去 3 分，这样她在失去 3 分前必须有 8 分才能使最终得分为 5 分。因此玛丽赢了 4 盘。朱安赢了 3 盘，故答案为(A)。

Test 11, question 14:

Solution

If Juan won 3 games then Mary lost 3 points so that she must have had 8 points before losing in order to have a final total of 5.

If Mary had 8 points before losing then she must have won 4 games.

If Mary won 4 games and Juan won 3 games there was a total of 7 games.　　ANSWER: (A)

试卷十一第 17 题：

解：

肥皂被使用的次数	近似的剩余体积(%)
1	0.9 或 90%
2	$(0.9)^2$ 或 81%
3	$(0.9)^3$ 或 72.9%
4	$(0.9)^4$ 或 65.61%
5	$(0.9)^5$ 或 59.1%
6	$(0.9)^6$ 或 53.1%
7	$(0.9)^7$ 或 47.8%

即肥皂使用 7 次后其体积已小于原来的一半，故答案为(C)。

Test 11, question 17:

Solution

Number of Times Soap Used	Approximate Volume Remaining (as %)
1	0.9 or 90%
2	$(0.9)^2$ or 81%
3	$(0.9)^3$ or 72.9%
4	$(0.9)^4$ or 65.61%
5	$(0.9)^5$ or 59.1%
6	$(0.9)^6$ or 53.1%
7	$(0.9)^7$ or 47.8%

So if the soap is used 7 times the volume will be less than $\frac{1}{2}$ of the original volume.　ANSWER: (C)

试卷十一第 19 题：

解：

从 1 至 n 自然数和的计算公式为$\frac{n(n+1)}{2}$。根据题意有：

$(1+1)+(2+2)+(3+3)+\cdots+(n+n)\leqslant 3\ 000$

$2(1+2+3+\cdots+n)\leqslant 3\ 000$

$2\frac{n(n+1)}{2}\leqslant 3\ 000$

$n(n+1)\leqslant 3\ 000$

Test 11, question 19:

Solution

The formula for the sum of the natural numbers from 1 to n is $\frac{n(n+1)}{2}$.

That is, $1+2+3+\cdots+n=\frac{n(n+1)}{2}$.

(For example, $1+2+3+\cdots+10=\frac{10\times 11}{2}=55$.)

We can find the sum of a double series, like the one given, by doubling each side of the given formula.

We know $1+2+3+\cdots+n=\frac{n(n+1)}{2}$.

If we double each side we get $2(1+2+\cdots+n)=n(n+1)$

采用尝试误差法，取 $n=54, 54\times55=2\,970<3\,000$，取 $n=55, 55\times56=3\,080>3\,000$，则最长的线段为 54 厘米，故答案为(C)。

So, $(1+1)+(2+2)+(3+3)+\cdots+(n+n)=n(n+1)$.

In this question we want the value of n so that the following is true:

$(1+1)+(2+2)+(3+3)+\cdots+(n+n)\leqslant 3\,000$.

Or, if we use the formula $n(n+1)\leqslant 3\,000$.

We would now like to find the largest value of n for which this is true.

The best way to start is by taking $\sqrt{3\,000}=54.7$ as a beginning point.

If we try $n=54$, we find $(54)(55)=2\,970<3\,000$ which is a correct estimate.

(If we try $n=55$ we find $55(56)=3\,080>3\,000$. So $n=55$ is not acceptable.)

This means that $(1+1)+(2+2)+(3+3)+\cdots+(54+54)=2\,970$ so that the longest length that Dana completed was 54 cm. (If we had included the length 55 then we would have had a sum of 3 025 which is too large.) ANSWER: (C)

试卷十一第 20 题：

解：

p 和 q 是自然数，个位数不为零，并且两者的乘积为 10 的幂，因此可以把 p 表示为 5^n，q 表示为 2^n，n 为自然数。这样有：

n	p	q	$p-q$ 的个位数
1	5	2	3
2	25	4	1
3	125	8	7
4	625	16	9
5	3 125	32	3
6	15 625	64	1
…	…	…	7
…	…	…	9
…	…	…	

即 $p-q$ 的个位数不可能是 5，故答案为(C)。

Test 11, question 20:

Solution

If the two natural numbers p and q do not end in zero themselves and if their product is a power of 10 then p must be of the form 5^n and q must be of the form 2^n.

This is true because $10=2\times5$ and $10^n=(2\times5)^n=2^n\times5^n$.

The possibilities for powers of two are 2, 4, 8, 16, 32, … and for corresponding powers of five are 5, 25, 125, 625, 3 125, ….

If we take their differences and look at the last digit of $p-q$ we find the following.

p	q	last digit of $p-q$
5	2	3
25	4	1
125	8	7
625	16	9
3 125	32	3
15 625	64	1
.	.	7
.	.	9
.	.	⋮

and the pattern continues in groups of 4.

Thus, the last digit of $p-q$ cannot be 5.

ANSWER: (C)

试卷十二第 12 题:

解:

数列中第一个数是 2,第三个数是 9,则第二个数必须是 7。这样可以写出数列:2,7,9,16,25,41,66,107,…,即第八个数是 107,故答案为(C)。

Test 12, question 12:

Solution

If the first number in the sequence is 2 and the third is 9, the second number in the sequence must be 7. The sequence is thus: 2,7,9,16,25,41,66,107. The eighth term is 107.

ANSWER: (C)

试卷十二第 15 题:

解:

最初 9 个正奇数的和是 81,这表明每列数值的和为 $\frac{81}{3}=27$。因此 $B=11$, $A=15$, $D=7$, $E=17$。$A+E=32$,故答案为(A)。

Test 12, question 15:

Solution

The first nine odd positive integers sum to 81.

This implies that the sum of each column is $\frac{81}{3}$ or 27. From this we immediately see that $B=11$ since $B+13+3=27$. If we continue with the constraint that each row or column must add to 27 then $A=15 \rightarrow D=7 \rightarrow E=17$. Therefore, $A+E=15+17=32$.

ANSWER: (A)

试卷十二第 19 题:

解:

根据题意应采用最多的球的个数。首先用 10 个小球,全部通过 1 号洞,这样还剩有 $23-10=13$ 分用中球和大球完成。可以用 2 个大球,1 个中球($5+5+3=13$),即总计用 $10+3=13$ 个球,也可以用 4 个中球,但有一个要通过 4 号洞($3+3+3+4=13$),即总计用 $10+4=14$ 个球。多种方法组合可发现最多只能用 14 个球,故答案为(C)。

Test 12, question 19:

Solution

We are looking for a *maximum* so we want to use lots of marbles. Let's start with 10 small ones. If they all go through hole #1, we have $23-10=13$ points to be divided between medium and large marbles. We could use 2 large and 1 medium ($5+5+3=13$) and thus use $10+3=13$ marbles or we could use 4 medium and have one of these go through hole #4 ($3+3+3+4=13$) which gives 14 marbles. Alternatively, of the 10small marbles, if 9 go through hole #1 and 1 goes through hole #2, we have scored 11 points. The 4 medium marbles can now go through hole #3 giving a score of $11+3\times4=23$. This again gives a total of 14 marbles.

ANSWER: (C)

试卷十二第 20 题：

解：

每个队与其他队比赛一场的总次数为 $3+2+1=6$，每个队与其他队比赛四场的总次数则为 $4\times6=24$。赢一场得 3 分，若每场比赛都有胜者，则总分为 $3\times24=72$ 分，但实际总分只有 $22+19+14+12=67$ 分。平一场每队各得 1 分(即一场为 2 分)，因此低于 72 分的每 1 分表示平一场。$72-67=5$，即有 5 场打平，故答案为(C)。

试卷十三第 13 题：

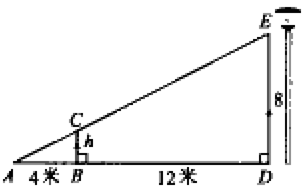
解：

有 3 个星期天的日期为偶数，2 个星期天的日期为奇数，表明第一个星期天的日期为偶数。另外，第一个星期天的日期也不可能是 4 号以后，这样一个月就不可能有 5 个星期天。因此，这 5 个星期天的日期应分别为 2 号，9 号，16 号，23 号和 30 号，而 8 号则为星期六，故答案为(A)。

试卷十三第 17 题：

解：

图示有萨姆向灯杆走近的情况。

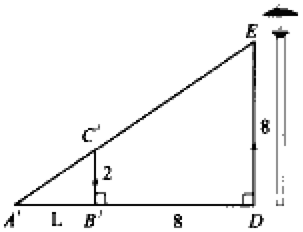


因为$\triangle ABC$ 与$\triangle ADE$ 相似，它们的对应边成比例。若萨姆的高为 h，则有：

$$\frac{h}{4}=\frac{8}{16}$$

$h=2$ 米

当萨姆离灯杆 8 米时，设影子的长度为 C



根据相似三角形的原理仍有：

$$\frac{L}{2}=\frac{L+8}{8}$$

$L=2\frac{2}{3}$米　故答案为(D)。

Test 12, question 20:

Solution

When every team plays every other team there are $3+2+1=6$ games. Since each team plays each of the other teams 4 times, there are $4(6)=24$ games.

When there is a winner 3 points are awarded. If each of the 24 games had winners there would be $24\times3=72$ points awarded. The actual point total is $22+19+14+12=67$.

When there are ties, only $1+1=2$ points are awarded and so every point below 72 represents a tie.

Thus, the number of ties is $72-67=5$.　ANSWER: (C)

Test 13, question 13:

Solution

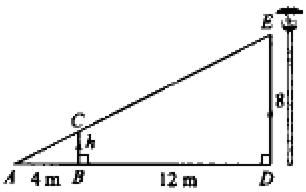
Since three of the Sundays fall on even numbered days and two on odd numbered days this implies that the first Sunday of the month must fall on an even numbered day. Note that it is not possible for a Sunday to fall on the 4th day of the month because the 5th Sunday would then have to fall on the 32nd day of the month. The five Sundays will fall on the following days of the calendar: 2, 9, 16, 23, 30.

April 8 must be a Saturday.　ANSWER: (A)

Test 13, question 17:

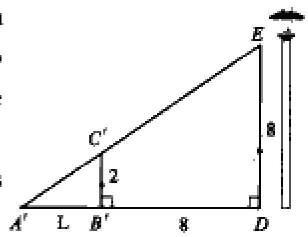
Solution

As Sam approaches the lamp post, we can visualize his position, as shown.



Since $\triangle ABC$ and $\triangle ADE$ are similar, the lengths of their corresponding sides are proportional. To determine Sam's height h, we solve $\frac{h}{4}=\frac{8}{16}$, and therefore $h=2$ m.

As Sam moves to a position that is 8m from the lamp post we now have the situation, as shown.



Using similar triangles as before, we can now calculate, L, the length of the shadow.

Thus, $\frac{L}{2}=\frac{L+8}{8}$.

试卷十三第 18 题:

解:

将有关数据列表如下:

正方形序号	边长
1	0.5 千米
2	1.0 千米
3	1.5 千米
4	2.0 千米
5	2.5 千米
6	3.0 千米
7	3.5 千米

面积	累计面积
0.25 平方千米	0.25 平方千米
1.00 平方千米	1.25 平方千米
2.25 平方千米	3.50 平方千米
4.00 平方千米	7.50 平方千米
6.25 平方千米	13.75 平方千米
9.00 平方千米	22.75 平方千米
12.25 平方千米	35.00 平方千米

即有 7 个正方形,故答案为(C)。

试卷十三第 20 题

解:

任选一个方向即可发现蓝色砖的数量与白色砖的数量之比为 1:2,故答案为(E)。

Using the property of equivalent fractions, $\frac{L}{2}=\frac{4L}{8}=\frac{L+8}{8}$.

Thus ,$4L=L+8 \quad 3L=8 \quad L=2\frac{2}{3}$ m

ANSWER:(D)

Test 13,question 18:

Solution

We complete the following chart, one row at a time, until 35 appears in the third column.

Number of the square	Length of the square	Area of the square	Cumulative sum of areas
1	0.5 km	0.25 km^2	0.25 km^2
2	1.0 km	1.00 km^2	1.25 km^2
3	1.5 km	2.25 km^2	3.50 km^2
4	2.0 km	4.00 km^2	7.50 km^2
5	2.5 km	6.25 km^2	13.75 km^2
6	3.0 km	9.00 km^2	22.75 km^2
7	3.5 km	12.25 km^2	35.00 km^2

Since there are seven rows, we conclude that there are seven squares.　ANSWER:(C)

Test 13,question 20:

Solution

Let's start by considering seven tile configurations made up of one blue tile surrounded by six white tiles. If we look just at this tiling only in this way, it appears that there are six times as many white tiles as blue tiles. However , each white tile is adjacent to three different blue tiles. This means that every white tile is part of three different seven tile configurations. Thus, if we count white tiles as simply six times the number counted we will miss the fact that each white tile has been triple counted. Hence the number of white tiles is six times the number of blue tiles divided by three, or twice the number of blue tiles. The ratio of the number of blue tiles to the number of white tiles is 1:2.　ANSWER:(E)

试卷十四第 10 题

解：

小于 15 的质数有 2,3,5,7,11,13。这些质数乘以 2 再减去 1,得到 3,5,9,13,21,25,其中共有 3 个质数,即有 3 个“超质数”,故答案为(B)。

Test 14, question 10:

Solution

The only possible candidates for 'Superprimes' are 2, 3,5,7,11 and 13 since they are the only prime numbers less than 15. If we double each of these numbers and then subtract 1 we get 3,5,9,13,21 and 25. Three of these results are prime numbers. So there are only three Superprimes.　ANSWER: (B)

试卷十四第 15 题：

解：

安妮至少分 3 块,克里斯可以分 2 块或 3 块。这表明着克里斯分 2 块,贝丝可以分 5 块。安妮和克里斯分的块数增加,贝丝分的块数可减少至 2 块,故答案为(E)。

Test 14, question 15:

Solution

If Anne gets at least 3 candies and Chris gets either 2 or 3 this implies that Beth could get as many as 5 candies if Chris gets only 2. If Chris and Anne increase their number of candies this means that Beth could get any number of candies ranging from 2 to 5.

ANSWER: (E)

试卷十四第 19 题：

解：

下列表中列有每个鱼缸中鱼的可能条数。三条连线的结果有 20 条虹鳉鱼,即 2 + 18,8 + 12 和 14 + 6,对应的金鱼数目则为 33,32 和 31。因此至少有金鱼 31 条,故答案为(C)。

第1个鱼缸	
虹鳉鱼条数	金鱼条数
2	**3**
4	6
6	9
8	**12**
10	15
12	18
14	**21**
16	24
18	27

第2个鱼缸	
虹鳉鱼条数	金鱼条数
3	5
6	**10**
9	15
12	**20**
15	25
18	**30**

Test 14, question 19:

Solution

The following tables give the possible numbers of fish in each aquarium.

The three lines join the results which give a total of 20 guppies, namely 2 + 18, 8 + 12 and 14 + 6. The corresponding numbers of goldfish are 33,32 and 31. The least number of goldfish that he could have is 31.

ANSWER: (C)

1st aquarium	
Number of guppies	Number of goldfish
2	**3**
4	6
6	9
8	**12**
10	15
12	18
14	**21**
16	24
18	27

2nd aquarium	
Number of guppies	Number of goldfish
3	5
6	**10**
9	15
12	**20**
15	25
18	**30**

试卷十四第 20 题：

解：

若罗恩用三个最短的长度都不能形成三角形，则应从 1,1,2 开始。将后面两个数相加可构成一数列：1,1,2,3,5,8,13,21,…可见用这个数列中任何三个数都不能形成三角形。因此 8 根棍中最长的一根的最短长度为 21，故答案为(B)。

Test 14, question 20:

Solution

If Ron wants the three smallest possible lengths with which he cannot form a triangle, he should start with the lengths 1, 1 and 2. (These are the first three Fibonacci numbers). If he forms a sequence by adding the last two numbers in the sequence to form the next term, he would generate the sequence: 1, 1, 2, 3, 5, 8, 13, 21. Notice that if we take any three lengths in this sequence, we can never form a triangle. The shortest possible length of the longest stick is 21. ANSWER: (B)

试卷十五第 13 题：

解：

可先检查各答案：

答案	数	除数	除自身之外的除数和
(A)	10	1,2,5,10	1+2+5=8
(B)	13	1,13	1
(C)	6	1,2,3,6	1+2+3=6
(D)	8	1,2,4,8	1+2+4=7
(E)	9	1,3,9	1+3=4

可见 6 是完全数，故答案为(C)。

Test 15, question 13:

Solution

We must check each of the answers:

	Number	Positive divisors
(A)	10	1,2,5,10
(B)	13	1,13
(C)	6	1,2,3,6
(D)	8	1,2,4,8
(E)	9	1,3,9

Sum of all positive divisors except itself

1+2+5=8

1

1+2+3=6

1+2+4=7

1+3=4

The only number from this set that is a perfect number is 6. (Note that the next two perfect number bigger than 28 are 496 and 8 128.) ANSWER: (C)

试卷十五第 18 题：

解：

取得黑色的球或金色的球的概率是 $\frac{3}{7}$，因此袋子中球的总数应为 7 的倍数，即可能会是 7,14,21,28 等等。但黑色的球和金色的球一共有 9 个，因此袋子中的球应是 21 个。原来有 17 个球，马克又向袋子中加了 4 个白球，故答案为(D)。

Test 15, question 18:

Solution

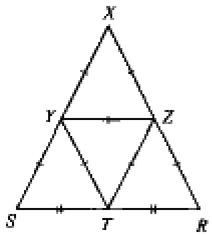
Since the probability of selecting a black or gold marble is $\frac{3}{7}$, this implies that the total number of marbles in the bag is a multiple of 7. That is to say, there are possibly 7, 14, 21, 28, etc. marbles in the bag. The only acceptable number of marbles in the bag is 21, since there are 9 marbles in total which are

black or gold, and $\frac{9}{21}=\frac{3}{7}$. If there are 21 marbles in the bag, this means that 4 marbles must have been added, since there are 17 already accounted for.
ANSWER: (D)

试卷十五第 19 题:

解:

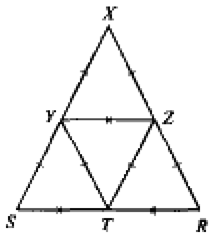
平形四边形的边长为 8, 面积则为 64。$\triangle XSR$ 的面积为 $\frac{1}{2}\times 8\times 8=32$, 若在 SR 上取中点 T, 并且连接 Y 和 Z, 则可形成 4 个全等三角形, 面积均为 $\frac{1}{4}\times 32=8$。而梯形由 3 个全等三角形组成, 则其面积为 24, 故答案为(A)。



Test 15, question 19:

Solution

If $PQRS$ is a square with side length 8, it must have an area of 64 square units. The area of $\triangle XSR$ is thus $\frac{1}{2}\times 8\times 8=32$. If we take the point T to be the midpoint of SR and join Y and Z to T, we would have the following diagram.



Each of the four smaller triangles contained within $\triangle XSR$ has an equal area, which is therefore $\frac{1}{4}\times 32=8$. Since the area of trapezoid $YZRS$ is made up of three of these triangles, it has an area of $3\times 8=24$.
ANSWER: (A)

试卷十五第 20 题:

解:

先写下所有用个位数相乘得到 24 的方法:

(Ⅰ)$24=1\times 4\times 6$

(Ⅱ)$24=1\times 3\times 8$

(Ⅲ)$24=2\times 3\times 4$

(Ⅳ)$24=2\times 2\times 6$

第一、二、三种情况各有六种组合, 例如: 146、164、416、461、614、641。

第四种情况有三种组合, 即为 226, 262 和 622。所以一共有 21 个整数。故答案为(E)。

Test 15, question 20:

Solution

First, we determine all of the possible ways to write 24 as the product of single-digit numbers.

(Ⅰ)$24=1\times 4\times 6$

(Ⅱ)$24=1\times 3\times 8$

(Ⅲ)$24=2\times 3\times 4$

(Ⅳ)$24=2\times 2\times 6$

The cases numbered (Ⅰ), (Ⅱ) and (Ⅲ) each give 6 possible arrangements. For example, if we consider $24=1\times 4\times 6$, the 6 possibilities are then 146, 164, 416, 461, 614, and 641. So for cases (Ⅰ), (Ⅱ) and (Ⅲ), we have a total of 18 Possibilities.

For the fourth case, there are only 3 possibilities, which are 226, 262 and 622.

In total there are $18+3=21$ possibilities.

ANSWER: (E)

试卷十六第 14 题：

解：

亚伯拉罕的试卷共有 80 个试题。他的得分为 80%，即有 $80\times80\%=64$ 个题目答对。30 个代数题有 $30\times70\%=21$ 个题目答对，因此有 $64-21=43$ 个几何题答对，故答案为(A)。

试卷十六第 17 题：

解：

卢克 20 场比赛赢了 95%，而为 $20\times95\%=19$ 场，故只输了 1 场。若使赢场的百分率达到 96%，他的输场应为 4%，或$\frac{1}{25}$，因此他还需再赢 5 场比赛，故答案为(D)。

试卷十六第 19 题：

解：

将数的排列改写成下列形式：

可见下一排数的和是上一排数的和的两倍，或者是：

第一排　$3=1\times3$

第二排　$6=2\times3$

第三排　$12=4\times3=2^2\times3$

第四排　$24=8\times3=2^3\times3$

因此第十三排数的和应为 $2^{12}\times3=12\ 288$，故答案为(D)。

```
        1   2                         1    2
      1   3   2                    1   1+2   2
    1   4   5   2               1   1+3   3+2   2
  1   5   9   7   2          1   1+4   4+5   5+2   2
  ⋰       ⋮       ⋱              ⋰        ⋮         ⋱
```

Test 16, question 14:

Solution

Abraham's exam had a total of 80 questions. Since he received a mark of 80%, he got $\frac{80}{100}\times80=\frac{8}{10}\times80=$ 64 questions correct.

We also know that Abraham answered 70% of the 30 algebra questions correctly, or a total of 21 questions. This tells us that he answered 43 of the geometry questions correctly.　ANSWER: (A)

Test 16, question 17:

Solution

Since Luke has a 95% winning percentage, then he hasn't won 5%, or $\frac{1}{20}$, of his games to date. Since he has played only 20 games, there has only been 1 game that he has not won.

For Luke to have exactly a 96% winning percentage, he must not have won 4%, or $\frac{1}{25}$, of his games. Since he wins every game between these two positions, when he has the 96% winning percentage, he has still not won only 1 game. Therefore, he must have played 25 games in total, or 5 more than initially.　ANSWER: (D)

Test 16, question 19:

Solution

To get a better understanding of the pattern let us write each of the numbers in the way that it is obtained:

We can see from these two patterns side by side that each number in a row is accounted for *twice* in the row below. (The 1 or 2 on the end of a row appears again at the end of the row and as part of the sum in one number in the next row. A number in the middle of a row appears as part of the sum in two numbers in the next row).

Therefore, the sum of the numbers in a row should be two times the sum of the numbers in the previous row.

We can check this:

Sum of the numbers in the 1st row　　3

试卷十六第 20 题:

解:

对各种情况进行分析,最后用尝试误差法确定正确答案。先写下计算式:$\begin{array}{r} A\ \ B \\ \times\ \ C \\ \hline D\ E\ F \end{array}$,并用数字 1 至 6 代替 A,B,C,D,E 和 F。

考虑 $C=1$ 的情况。若 $C=1$,B 必须与 F 相同,故不可能。

考虑 $C=5$ 的情况。若 $C=5$,B 是奇数,则 $B=5$,B 是偶数,则 $B=0$,都不可能。

考虑 $C=6$ 的情况。将有关情况表示如下:

B	F	
1	6	有两个 6,不可能
2	2	有两个 2,不可能
3	8	有 8,不可能
4	4	有两个 4,不可能
5	0	有 0,不可能

考虑 $C=4$ 的情况。用上述同样的方法分析,B 必须是 3,F 必须是 2。

考虑 $C=3$ 的情况。用上述同样的方法分析,B 必须是 2 或 4,F 必须是 6 或 2。

考虑 $C=2$ 的情况。用上述同样的方法分析,B 必须是 3,F 必须是 6。

Sum of the numbers in the 2nd row	6
Sum of the numbers in the 3rd row	12
Sum of the numbers in the 4th row	24

Thus, the sum of the numbers in the thirteenth row should be the sum of the elements in the first row multiplied by 2 twelve times, or $3\times 2^{12}=3\times 4\,096=12\,288$. ANSWER: (D)

```
        1   2
      1   3   2
    1   4   5   2
  1   5   9   7   2
  ⋰       ⋮       ⋱
```

```
            1     2
        1    1+2     2
    1    1+3    3+2     2
1    1+4    4+5    5+2     2
⋰           ⋮           ⋱
```

Test 16, question 20:

Solution

We will present a complete consideration of all of the cases. The answer can be obtained more easily in a trial and error fashion.

First, we rewrite the equation putting letters in each of the boxes

$$\begin{array}{r} A\ \ B \\ \times\ \ C \\ \hline DEF \end{array}$$

We want to replace A, B, C, D, E, and F by the digits 1 through 6.

Could C be 1?

If C was 1, then B and F would have to be same digit, which is impossible since all of the digits are different. Therefore, C cannot be 1.

Could C be 5?

If C was 5, then if B were odd, F would also be 5, which would be impossible. If C was 5 and B even, then F would have to be 0, which is also impossible. Therefore, C cannot be 5.

Could C be 6?

If C was 6, let us list the possibilities for B and the resulting value of F:

B	*F*	
1	6	Impossible-two 6's
2	2	Impossible-two 2's
3	8	Impossible-no 8
4	4	Impossible-two 4's
5	0	Impossible-no 0

若 $C=2$，有 $\begin{array}{r} A3 \\ \times\ 2 \\ \hline DE6 \end{array}$，进一步分析也是不可能的。

同样，进一步分析 $C=4$ 也是不可能的。

若 $C=3$，有 $\begin{array}{r} 54 \\ \times 3 \\ \hline 162 \end{array}$，故答案为(B)。

Therefore, C cannot be 6.

Could C be 4?

If C was 4, using a similar chart, we can see that B must be 3 and F must be 2. We will consider this possibility later.

Could C be 3?

If C was 3, using a similar chart, we can see that B must be 2 or 4 and F must be thus 6 or 2.

Could C be 2?

If C was 2, using a similar chart, we can see that B must be 3 and F must be 6.

Let us consider the case of $C=2$. In this case, we have $\begin{array}{r} A\ 3 \\ \times\ \ 2 \\ \hline D\,E\,6 \end{array}$ Since the product has three digits, and the possibilities remaining for A are 1, 4 or 5, then A must be 5. However, this gives a product of $53\times 2=106$, which is impossible.

Similarly, trying the case of $C=4$, we are left with the possibilities for A being 1, 5, or 6, none of which work.

Therefore, C must be 3, since this is the only possibility left. We should probably check that we can actually get the multiplication to work, though!

Trying the possibilities as above, we can eventually see that $54\times 3=162$ works, and so $C=3$.　ANSWER: (B)

试卷十七第 17 题：

解：

设 C 代表大杯的容量，S 代表小杯的容量，根据题意有：

$9S+4L=6S+6L$

$3S=2L$

即 9 个小杯可用 6 个大杯代替，一罐水果汁也可用 10 个大杯来盛满，故答案为(C)。

Test 17, question 17:

solution

Let the volume of a large glass be L and of a small glass be S. Since the jug can exactly fill either 9 small glasses and 4 large glasses, or 6 small glasses and 6 large glasses, then $9S+4L=6S+6L$ or $3S=2L$. In other words, the volume of 3 small glasses equals the volume of 2 large glasses. (We can also see this without using algebra -if we compare the two cases, we can see that if we remove 3 small glasses then we increase the volume by 2 large glasses.) Therefore, the volume of 9 small glasses equals the volume of 6 large glasses. Thus, the volume of 9 small glasses and 4 large glasses equals the volume of 6 large glasses and 4 large glasses, or 10 large glasses in total, and so the jug can fil 10 large glasses in total.　　ANSWER: (C)

试卷十七第 18 题：

解：

沙伦在城市道路上行驶了$\frac{2}{3}\times 45=30$千米，故要在高速公路上行驶 59－30＝29 千米。她用了$\frac{1}{3}$小时，则速度为$\frac{29}{\frac{1}{3}}=87$千米/小时，故答案为(C)。

试卷十七第 19 题：

解：

先考虑这一选手得到 8 块银牌，则总分为 24 分，又等于 27 分，故不对。

考虑 7 块银牌，则 7 项比赛的得分为 21 分，还有一项比赛要得 6 分，也不对。

考虑 6 块银牌，则 6 项比赛的得分为 18 分，还有两项比赛要得 9 分，也不对。

考虑 5 块银牌，则 5 项比赛的得分为 15 分，还有三项比赛要得 12 分，也不对。

考虑 4 块银牌，则 4 项比赛的得分为 12 分，还有 4 项比赛的得分应为 15 分，这是可能的，即有 3 项比赛得到金牌(15 分)，1 项比赛未得到奖牌(0 分)，故答案为(D)。

Test 17, question 18:

Solution

In her 40 minutes (or $\frac{2}{3}$ of an hour) on city roads driving at an average speed of 45 km/h, Sharon drives $\left(\frac{2}{3}\text{h}\right)\times(45\text{ km/h})=30$ km. So the distance that she drives on the highway must be 59 km − 30 km = 29 km. Since she drives this distance in 20 minutes (or $\frac{1}{3}$ of an hour), then her average speed on the highway is $\frac{29\text{ km}}{\frac{1}{3}\text{h}}=(29\times 3)$ km/h = 87 km/h。

ANSWER: (C)

Test 17, question 19:

Solution

We consider each possible number of silver medals staring with 8.

Could she have won 8 silver medals? This would account for 24 points in 8 events, but since she won 27 points in 8 events, this is not possible.

Could she have won 7 silver medals? This would account for 21 points in 7 events, and so in the remaining 1 event, she would have won 6 points, which is impossible, since she could not score more than 5 points (a gold medal) on this event.

Could she have won 6 silver medals? This would account for 18 points in 6 events, and so in the remaining 2 events, she would have won 9 points, which is impossible, since we cannot combine either two 5s, two 1s or a 1 and a 5 to get 9.

Could she have won 5 silver medals? This would account for 15 points in 5 events, and so in the remaining 3 events, she would have won 12 points, which is impossible. (Try combining up to three 5s and 1s to get 12. We need at least two 5s and two 1s to make 12.)

Could she have won 4 Silver medals? This would account for 12 points in 4 events, and so in the remaining 4 events, she would have won 15 points, This is possible-she could win gold on 3 of the 4

remaining events (for 15 points in total) and no medal on the last event (there are 6 competitors and only 3 medals for each event, so there are competitors who do not win medals). Thus, the maximum number of silver medals she could have won is 4.

ANSWER: (D)

试卷十七第 20 题:

解:

设网格一共有 n 列。

将骨牌横向放置有 $10\times(n-1)$ 个位置,将骨牌纵向放置则有 $(10-1)\times n$ 个位置。因此有:

$10\times(n-1)+(10-1)\times n=2\ 004$

$10n-10+9n=2\ 004$

$19n=2\ 014$

$n=106$

即有 106 列,故答案为(B)。

Test 17, question 20:

Solution

Start with a grid with two columns and ten rows. There are 10 ways to place the domino horizon tally (one in each row) and 18 ways to place the column vertically (nine in each column), so 28 ways overall. How many more positions are added when a new column is added? When a new column is added, there are 9 new vertical positions (since the column has ten squares) and 10 new horizontal positions (one per row overlapping the new column and the previous column). So there are 19 new positions added.

How many times do we have to add 19 to 28 to get to 2004? In other words, how many times does 19 divide into 2 004 - 28 = 1 976? Well, 1 976 ÷ 19 = 104, so we have to add 104 new columns to the original 2 columns, for 106 columns in total.

ANSWER: (B)

第二部分　试题参考答案

试卷一	试卷二	试卷三	试卷四	试卷五	试卷六	试卷七	试卷八	试卷九
1.D	1.E	1.C	1.B	1.C	1.A	1.C	1.E	1.B
2.D	2.B	2.D	2.C	2.D	2.C	2.D	2.A	2.D
3.C	3.C	3.B	3.A	3.C	3.A	3.C	3.C	3.B
4.C	4.C	4.C	4.C	4.B	4.A	4.B	4.C	4.E
5.B	5.C	5.D	5.E	5.D	5.C	5.D	5.D	5.B
6.E	6.A	6.E	6.B	6.D	6.D	6.B	6.C	6.C
7.D	7.B	7.B	7.A	7.C	7.C	7.C	7.E	7.D
8.E	8.B	8.B	8.B	8.D	8.C	8.C	8.D	8.A
9.C	9.C	9.A	9.A	9.C	9.A	9.D	9.D	9.A
10.D	10.D	10.E	10.D	10.B	10.C	10.D	10.D	10.D
11.C	11.D	11.A	11.C	11.E	11.E	11.D	11.D	11.B
12.D	12.E	12.B	12.E	12.E	12.D	12.C	12.A	12.E
13.D	13.B	13.C	13.D	13.C	13.C	13.C	13.B	13.D
14.C	14.C	14.E	14.D	14.B	14.B	14.D	14.A	14.B
15.A	15.C	15.C	15.A	15.B	15.B	15.B	15.A	15.B
16.A	16.A	16.E	16.D	16.A	16.D	16.D	16.B	16.E
17.B	17.B	17.C	17.D	17.D	17.B	17.C	17.E	17.D
18.C	18.E	18.B	18.C	18.B	18.C	18.C	18.E	18.E
19.C	19.B	19.E	19.B	19.E	19.C	19.C	19.B	19.A
20.C	20.E	20.A	20.B	20.C	20.A	20.C	20.B	20.D

试卷十	试卷十一	试卷十二	试卷十三	试卷十四	试卷十五	试卷十六	试卷十七
1.C	1.D	1.D	1.B	1.E	1.D	1.A	1.A
2.D	2.E	2.B	2.C	2.C	2.B	2.D	2.D
3.C	3.B	3.B	3.D	3.C	3.E	3.B	3.E
4.C	4.A	4.C	4.A	4.B	4.C	4.E	4.D
5.B	5.C	5.A	5.C	5.E	5.A	5.E	5.C
6.C	6.D	6.A	6.D	6.D	6.D	6.A	6.C
7.C	7.B	7.A	7.C	7.B	7.A	7.E	7.D
8.E	8.A	8.E	8.E	8.D	8.D	8.C	8.B
9.D	9.A	9.D	9.A	9.B	9.A	9.C	9.D
10.D	10.E	10.C	10.B	10.C	10.C	10.B	10.B
11.A	11.C	11.C	11.D	11.E	11.A	11.A	11.D
12.B	12.B	12.B	12.C	12.A	12.A	12.A	12.C
13.D	13.D	13.C	13.B	13.C	13.B	13.D	13.B
14.D	14.E	14.B	14.E	14.E	14.B	14.A	14.A
15.A	15.B	15.A	15.E	15.A	15.D	15.D	15.E
16.A	16.E	16.B	16.B	16.C	16.D	16.D	16.E
17.C	17.E	17.E	17.A	17.A	17.B	17.D	17.A
18.D	18.B	18.E	18.A	18.E	18.E	18.D	18.C
19.B	19.C	19.C	19.B	19.D	19.A	19.C	19.B
20.B	20.A	20.C	20.A	20.D	20.C	20.C	20.B

第二部分　试题讲解

Solutions of partial questions

试卷十一第 10 题：

解：

米切尔能组成的最大数为 $5\frac{3}{4}$，最小数为 $1\frac{2}{5}$。两者的差值是 $5\frac{3}{4}-1\frac{3}{5}=4\frac{7}{20}$，故答案为(E)。

试卷十一第 16 题：

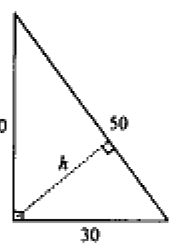
解：

把 315 分解成一些质数，我们得到 $315=3\times3\times5\times7$。将 315 表示为两个奇数的乘积则有 3×105，5×63，7×45，9×35，15×21，即有 5 种分解方法，故答案为(E)。

试卷十一第 18 题：

解：

因为 $30^2+40^2=50^2$，所以这是一个直角三角形，并且底边长为 50 个单位。三角形的面积为 $\frac{30\times40}{2}=600$ 个平方单位，从直角角顶向斜边作一垂直线，即高 h，则面积又可表示为 $\frac{1}{2}(h)(50)=25h$。因 $25h=600$，即 $h=24$，故答案为(B)。



Test 11, question 10:

Solution

The largest possible number that Michael can form is $5\frac{3}{4}$ while the smallest is $1\frac{2}{5}$.

The difference is $5\frac{3}{4}-1\frac{2}{5}=4\frac{7}{20}$.　ANSWER: (E)

Test 11, question 16:

Solution

Factoring 315 into primes, we find that $315=3\times3\times5\times7$.

The factorization of 315 as the product of 2 odd integers is 3×105, 5×63, 7×45, 9×35, and 15×21.

There are 5 possible factorizations.　ANSWER: (E)

Test 11, question 18:

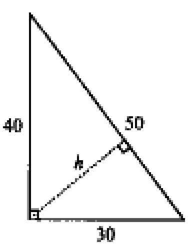
Solution

Since $30^2+40^2=50^2$ this is a right-angled triangle with a hypotenuse of 50units.

The area of the triangle is $\frac{30\times40}{2}$ or 600 sq. units.

If we draw a perpendicular from the right angle and call this height, h, an expression for the area is $\frac{1}{2}(h)(50)=25h$.

Equating the two, we have $25h=600$ or $h=24$ which is the length of the shortest altitude.



ANSWER: (B)

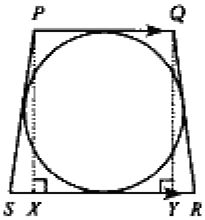
试卷十一第 19 题：

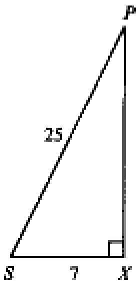
解：

从 P 点和 Q 点分别向 SR 作两条垂线，并交于 X 点和 Y 点，因此 $XY = PQ = 18$。另外，$SX = YR$，即 $SX = YR = \frac{32-18}{2} = 7$。在 $\triangle PSX$ 中应用勾股定理，有：

$$PX^2 + 7^2 = 25^2$$
$$PX^2 = 576$$
$$PX = 24$$

即圆的直径是 24 厘米，故答案为(C)。





试卷十二第 12 题：

解：

可以用下列通常的减法进行运算：

$$\begin{array}{r} 8\ 14\ 17 \\ 1\ \not9\ \not5\ \not7 \\ -\quad a\ \ 9 \\ \hline 1\ \ 8\ \ b\ \ 8 \end{array}$$

由此可得到 $14 - a = b$，或 $a + b = 14$，故答案为(B)。

试卷十二第 18 题：

解：

在 1 至 1 000 之间各位数的和等于 4 的数有：4，(13)，22，(31)，40，(103)，112，121，130，202，(211)，220，301，310，400。圈上的数是质数，即 15 个数中有 4 个质数，因此 $a + b = 4 + 15 = 19$，故答案为(E)。

Test 11, question 19:

Solution

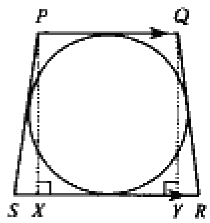
We start by drawing perpendiculars from P and Q to meet SR at X and Y respectively.

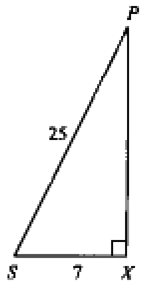
By symmetry, we see that $XY = PQ = 18$. We also note that $SX = YR$ which means that $SX = YR = \frac{32-18}{2} = 7$.

By applying the Pythagorean Theorem in $\triangle PXS$ we find,

$$(PX)^2 + 7^2 = 25^2$$
$$(PX)^2 = 576$$
$$PX = 24$$

The diameter of the circle is thus 24 cm.





ANSWER: (C)

Test 12, question 12:

Solution

If we treat the question as an ordinary subtraction question we get the following:

$$\begin{array}{r} 8\ 14\ 17 \\ 1\ \not9\ \not5\ \not7 \\ a\ \ 9 \\ \hline 1\ \ 8\ \ b\ \ 8 \end{array}$$

From this, $14 - a = b$ or $a + b = 14$.　ANSWER: (B)

Test 12, question 18:

Solution

The numbers between 1 and 1 000 that have 4 as the sum of their digits are 4, (13), 22, (31), 40, (103), 112, 121, 130, 202, (211), 220, 301, 310, 400.

The circled numbers are prime which means that 4 out of the 15 are prime and $a + b = 19$.

ANSWER: (E)

试卷十二第 19 题:

解:

雷蒙德的前 25 次业务中,每 5 个一组的费用是 $0.50+0.45+3\times(0.60)=2.75$。25 次业务的总费用为 13.75 美元。若要超过 15.95 美元,她还需花费 2.2 美元。要减少业务次数,她需使用自动计入借方四次。总的业务次数为 $25+4=29$,故答案为(A)。

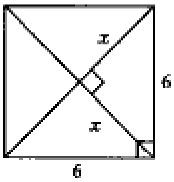
试卷十二第 20 题:

解:

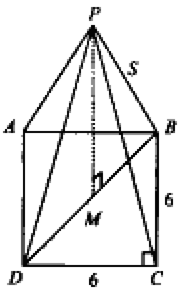
如图所示,在正方形底面上作两条对角线,对角线的一半为 x,因此:$x^2+x^2=36$

$x^2=18$

$x=\sqrt{18}$



再作一角锥并标注如图所示,以锥顶 P 向底面作一垂线 PM。由于角锥底面为正方形,M 点也是对角线的中点。

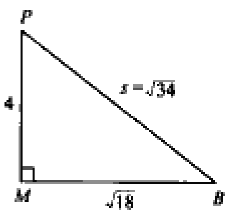


$\triangle PMB$ 中,计算角锥的棱角边长 s:

$s^2=4^2+(\sqrt{18})^2$

$s^2=34$

$s=\sqrt{34}$



Test 12, question 19:

Solution

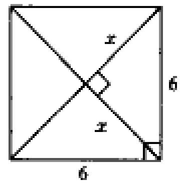
For Raymonde's first twenty five transactions, each set of five would cost. $0.50+0.45+3\times(0.60)=2.75$. After 25 transactions, her total cost would be \$13.75. In order to exceed \$15.95, she would have to spend \$2.20. In order to minimize the number of transactions, she would use Autodebit four times. In total, the number of transactions would be $25+4=29$.

ANSWER: (A)

Test 12, question 20:

Solution

We draw in the two diagonals of the base square and label as shown. We can now say,



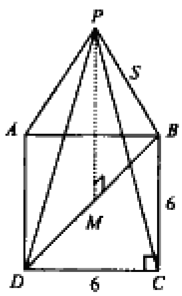
$x^2+x^2=36$

$2x^2=36$

$x^2=18$

$x=\sqrt{18}$.

In this part of the solution, we have drawn the completed pyramid and labelled it as shown. We draw a line perpendicular to the square base from P. By using the fact that the pyramid has a square base and its sides are equal we conclude that this perpendicular line will pass through the mid-point of diagonal DB at the point M.

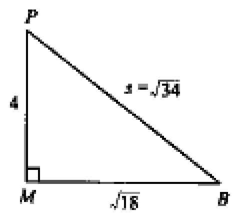


Using $\triangle PMB$, we can now calculate the side length, s, of the pyramid.

$s^2=4^2+(\sqrt{18})^2$

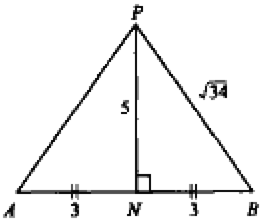
$s^2=34$

Therefore $s=\sqrt{34}$.



$\triangle PAB$ 中,计算其高:

$$PB^2 = PN^2 + NB^2$$
$$(\sqrt{34})^2 = PN^2 + 3^2$$
$$PN^2 = 25$$
$$PN = 5$$



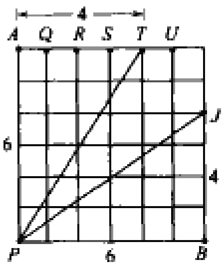
因此$\triangle PAB$ 的面积为$\frac{6\times5}{2}=15$。

而角锥的表面积为 $4\times15+6\times6=96$,故答案为(C)。

试卷十三第 15 题:

解:

如图所示,标上 A 点和B 点。整个正方形的面积为36,因此每一部分的面积为$\frac{36}{3}=12$,由于 $AP=6$,并可作为三角形的高,因此底边长应为 4,才有$\frac{1}{2}\times6\times4=12$,故应选 T 点,连接 AT。同理,另一点则为 J,故答案为(E)。



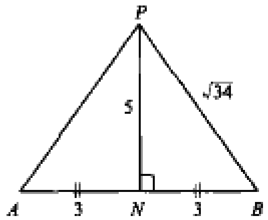
试卷十三第 17 题:

解:

$FS=5, SK=12$,则 $FR=13$(勾股定理)

If we wish to calculate the height of the side triangles, which are each isosceles, we once again draw a perpendicular from P to the mid-point of one side of the square. We use $\triangle PAB$ and label the mid-point of AB point N. (Since $\triangle PAB$ is isosceles, the point N is the mid-point of AB.) Once again, we use pythagoras to calculate the heights of the isosceles triangles.

$$PB^2 = PN^2 + NB^2$$
$$(\sqrt{34})^2 = PN^2 + 3^2$$
$$PN^2 = 34 - 9$$
$$PN^2 = 25$$
$$PN = 5.$$



We thus conclude that the height of each triangle is 5 and the area of each side triangle is $\frac{6\times5}{2}=15$.

Thus, the total area is $4\times15+6\times6=96$.

ANSWER:(C)

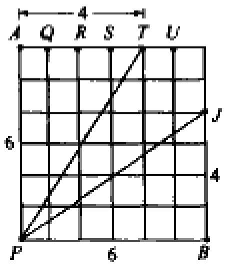
Test 13, question 15:

Solution

Label points A and B as shown.

The area of the whole square is 36.

Since the square is divided into three equal areas, each area must be, $\frac{36}{3}=12$.



The first required point must be one of the points from Q to U. It would have to be a part of a right triangle which would have AP as its height (or its base). Since $AP=6$ then the base of the triangle would have to be 4 since $\frac{1}{2}\times6\times4=12$, T is the only point that meets the requirement. In the same way, J also meets the requirement. The required points are thus J and T. ANSWER:(E)

Test 13, question 17:

Solution

$FS=5, SK=12 \Rightarrow FR=13$. (By Pythagoras, $FR^2=5^2+12^2=169$)

$SG=9, SK=12$，则 $GR=15$（勾股定理）

（Ⅰ）$FR+RS+SG=13+12+9=34$ 千米

（Ⅱ）$FS+SG+GR=5+9+15=29$ 千米

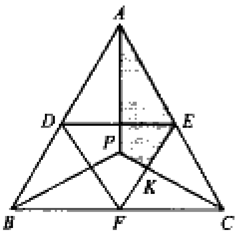
（Ⅲ）$FR+RG+GS=13+15+9=37$ 千米

（Ⅳ）$FS+SK+RG=5+12+15=32$ 千米

$37-29=8$ 千米，故答案为(A)。

试卷十三第 19 题：

解：



由于 P 点是$\triangle ABC$ 中的对称点，线段 CP 将$\triangle ECF$ 分成相等的两部分，即$\triangle EKC$ 的面积等于$\triangle FKC$ 的面积。$\triangle EFC$ 的面积又是$\triangle ABC$ 的$\frac{1}{4}$，故$\triangle EKC$ 的面积为：

$$\triangle EKC=(\frac{1}{2}\times\frac{1}{4})\triangle ABC$$
$$=\frac{1}{8}\triangle ABC$$

同样，P 点是$\triangle APC$ 的对称点，$\triangle APC$ 的面积是$\triangle ABC$ 的$\frac{1}{3}$。阴影部分的面积等于$\triangle APC$ 的面积减去$\triangle KCE$ 的面积，即为：

$\frac{1}{3}\triangle ABC-\frac{1}{8}\triangle ABC=\frac{5}{24}\triangle ABC$，故答案为(B)。

试卷十三第 20 题：

解：

若从这个特殊的糕点上取走一个巧克力片，则所有糕点上巧克力片数目相等，总数则为 999 个。现在要考察 999 的因素分解。

问题中提到罐子中糕点的个数介于 12 至 36 之间，因此 999 的因素分解只能是$(3\times3\times3)\times(37)$，即在 12 到 36 之间 999 的除数仅有 27，因此可以得到结论：糕点有 27 个。

普通糕点上的巧克力片为$\frac{999}{27}=37$ 个，特殊糕点上的巧克力片为 38 个。$27+38=65$，故答案为(A)。

$SG=9, SR=12\rightarrow GR=15$. (By Pythagoras, $GR^2=9^2+12^2=225$)

(Ⅰ) $FR+RS+SG=13+12+9=34$ km

(Ⅱ) $FS+SG+GR=5+9+15=29$ km

(Ⅲ) $FR+RG+GS=13+15+9=37$ km

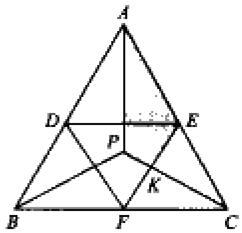
(Ⅳ) $FS+SR+RG=5+12+15=32$ km

$37-29=8$ km is the required distance.

ANSWER: (A)

Test 13, question 19:

Solution



Since P is a point of symmetry within $\triangle ABC$, the line segment CP divides $\triangle ECF$ into 2 triangles of equal area. That is to say, the area of $\triangle EKC$ equals the area of $\triangle FKC$. Since the area of $\triangle EFC$ is $\frac{1}{4}$ the area of $\triangle ABC$, the area of

$$\triangle EKC=\left(\frac{1}{2}\times\frac{1}{4}\right)\text{area of }\triangle ABC$$
$$=\frac{1}{8}(\text{area of }\triangle ABC).$$

Again since P is a point of symmetry within $\triangle ABC$, the area of $\triangle APC$ is $\frac{1}{3}$ the area of $\triangle ABC$.

Since the shaded area is the area of $\triangle APC$ minus area of $\triangle KCE$, it represtnts $\left(\frac{1}{3}-\frac{1}{8}\right)\times$ area of $\triangle ABC=\frac{5}{24}\times$ area of $\triangle ABC$. ANSWER: (B)

Test 13, question 20:

Solution

If we remove the extra chip from the special cookie, all cookies have the same number of chocolate chips for a total of 999 chips. We look at factorizations of 999.

The question states that the number of cookies in the jar is between 12 and 36 so this implies that the only factorization of 999 that works is $(3\times3\times3)(37)$.

Thus the only divisor of 999 between 12 and 36 is 27.

From this, we see that there are 27 cookies.

An ordinary cookie has $\frac{999}{27}=37$ chocolate chips, and

the special cookie has 38 chocolate chips. The required sum is $27+38=65$. ANSWER:(A)

试卷十四第 17 题:

解:

首先考虑正分值。大立方体每一面上有 16 个红色的小正方形,因此积分为 $6\times16=96$。但大立方体内部有 $2\times2\times2$ 个小方块没有被涂色,因此积分为 $8\times(-7)=-56$。总积分为 $96-56=40$,故答案为(A)。

Test 14, question 17:

Solution

First, we deal with the positive points. There is one point assigned for each red face. On each face of the large cube, there will be 16 red faces of $1\times1\times1$ cubes. This gives $6\times16=96$ red faces on $1\times1\times1$ cubes in total. So there are 96 positive points. However, there will be $2\times2\times2=8$ unit cubes which have no paint, and these will account for $8\times(-7)=-56$ points.

Then the point total for the cube is $96+(-56)=40$. (Notice that it was not necessary that we consider cubes with paint on either 3 sides or 2 sides if we use this method.) ANSWER:(A)

试卷十四第 18 题:

解:

首先要看到 6 张牌上数字的和为 31。若不能得到数字的和为 s,则也不能得到数字的和为 $31-s$。因若有数字的和为 $31-s$,则再加上 6 张牌上的数字即可得到和为 s。通过检查,在 1 至 15 中可得到的数字的和为 2,4,5,7,8,9,10,11,12,13,14,15,得不到的数字的和为 1,3,6。因此我们也得不到 $31-1=30$,$31-3=28$,$31-6=25$,即不能得到 6 个整数,故答案为(E)。

Test 14, question 18:

Solution

First, we observe that the sum of the digits on all 6 cards is 31.

Next, we see that if we cannot get a sum of S, then we cannot get a sum of $31-S$. This is an important point. If we could get $31-S$, then we could take the cards not used and their digits would add to S. Simply stated, our inability to get S means that we would be unable to get $31-S$.

So we need to check which sums from 1 to 15 cannot be obtained, and then double this total number. Checking possibilities, we see that we can get 2, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15 but cannot get 1, 3, 6. From above, we thus cannot get $31-1=30$, $31-3=28$ or $31-6=25$.

So there are 6 sums that cannot be obtained.

ANSWER:(E)

试卷十四第 20 题:

解:

当托尼和玛利亚第一次相遇时,托尼已经跑出 $700-70=630$ 米。而相遇时玛利亚已经到达山顶,并且按两倍的速度向山下跑出 70 米,或者说按原速度

Test 14, question 20:

Solution

When Tony and Maria meet for the first time, Tony has run $700-70=630$ m.

At this point, Maria has run 700 m up the hill and then 70 m at double the speed back down the hill.

已跑出 $700+\frac{70}{2}=735$ 米。这样玛利亚和托尼两人最初的速度比为 $\frac{735}{630}=\frac{7}{6}$，或者说托尼跑过 6 米，玛利亚则跑过 7 米。这样玛利亚到达山顶时，托尼仅跑到上山 600 米处。这时玛利亚与托尼的速度比为 $\frac{14}{6}$，这样托尼到达山顶（100 米远）与玛利亚下山的距离 s 的关系为：

$$6:100=14:s \qquad s=\frac{100\times 14}{6}=\frac{700}{3}$$

即玛利亚已跑过下山的三分之一路程。这时玛利亚与托尼的速度比又变为 $\frac{14}{12}$，玛利亚到达山底与托尼下山的距离 s_1 的关系为：$14:(700-\frac{700}{3})=12:s_1$

$$s_1=\frac{(700-\frac{700}{3}\times 12)}{14}=400 \text{ 米}$$

即托尼落后玛利亚 700－400＝300 米，故答案为(D)。

This takes her the same amount of time as if she had run 700 m up the hill and then 35 m more at the same speed.

In effect, she has run 735 m, while Tony has run 630 m. So the ratio of their speeds is $\frac{735}{630}=\frac{7(105)}{6(105)}=\frac{7}{6}$.

This means that for every 6 metres that Tony covers, Maria will cover 7 metres.

If we think of both runners as running at constant speeds, Maria runs $700+\frac{1}{2}(700)=1\ 050$ m at a constant speed over the course of the race. In effect, we are saying that she would run the equivalent of 1 050 m at the same constant speed at which she ran up the hill.

She runs $\frac{7}{6}$ as fast as Tony. In the time that Maria runs 1 050 m, Tony runs $\frac{6}{7}\times 1\ 050$ m = 900 m at a constant speed.

So in this new way of looking at the race, Tony is 150 m behind Maria.

But this 150 m is in the new way of looking at things, so Tony is actually 2×150 m = 300 m behind Maria. ANSWER: (D)

试卷十五第 15 题：

解：

先写下 7 的最初几个幂值：

$7^1=7, 7^2=49, 7^3=343, 7^4=2401, 7^5=16807, \cdots$

可见个位数的形式是：7，9，3，1，7，9，3，1，7，…。因此个位数是按 7，9，3，1 的形式进行循环。60 是 4 的倍数，即 7^{60} 的个位数是 1，则 7^{62} 的个位数应为 9，故答案为(D)。

Test 15, question 15:

Solution

If we write out the first few powers of 7,

$7^1=7, 7^2=49, 7^3=343, 7^4=2\ 401, 7^5=16\ 807, \cdots$

we can see that the units digit follows the pattern 7, 9, 3, 1, 7, 9, 3, 1, 7, …(That is to say, the units digit of a product depends only on the units digits of the numbers being multiplied together. This tells us that we only need to look at the units digit of the previous power to determine the units digit of a given power.)

So the pattern 7, 9, 3, 1, repeats in blocks of four. Since 60 is a multiple of 4, this means that 7^{60} has a units digit of 1, and so 7^{62} has a units digit of 9.

ANSWER: (D)

试卷十五第 16 题：

解：

由于面积为 36 平方厘米，边长为整数，各种可能可以列表如下：

Test 15, question 16:

Solution

Since the area is 36 cm^2 and the sides have integer length, then we make a table of the possibilities:

边长	周长
1,36	$2\times(1+36)=74$
2,18	$2\times(2+18)=40$
3,12	$2\times(3+12)=30$
4,9	$2\times(4+9)=26$
6,6	$2\times(6+6)=24$

因此可能的最大周长为 74 厘米,故答案为(D)。

试卷十五第 19 题:

解:

维罗妮卡 6 次考试成绩的最频值为 76,故应出现两次(因指的不可能有两次以上成绩相等),因此我们已经知道 4 次考试成绩为 50,76,76,94。另外 6 次考试成绩的中间值也为 76,因此按顺序排,2 个 76 分在中间。假设另一个低分 M 介于 50 和 76 之间,另一个高分 N 介于 76 和 94 之间,则有:

$$\frac{50+M+76+76+N+94}{6}=74(\text{平均分})$$

$$M+N=148$$

$$M=148-N$$

考虑到 M 的取值范围:$51\leqslant M\leqslant 75$,$N$ 的取值范围:$77\leqslant N\leqslant 93$,和上述关系,$M$ 的取值共有 17 个可能,故答案为(A)。

Side lengths	Perimeter
1,36	$2(1+36)=74$
2,18	$2(2+18)=40$
3,12	$2(3+12)=30$
4,9	$2(4+9)=26$
6,6	$2(6+6)=24$

So the maximum possible perimeter is 74 cm.

ANSWER:(D)

Test 15, question 19:

Solution

Since the mode of Veronica's 6 marks is 76, and only one mark appears more than once (and no marks appear more than twice), then two of the marks must be 76. This tells us that four of her marks were 50, 76, 76, 94.

Since the median of her marks is 76 and she has six marks in total (that is, an *even* number of marks), then the two marks of 76 must be 3rd and 4th when the marks are arranged in increasing order.

Let the second lowest mark be M, and the second highest be N. So the second lowest mark M is between (but not equal to) 50 and 76, and the second highest mark N is between (but not equal to) 76 and 94. We still need to use the fact that the mean of Veronica's marks is 74, so

$$\frac{50+M+76+76+N+94}{6}=74$$

$$M+N+296=444$$

$$M+N=148$$

$$M=148N(*)$$

We know already that M is one of 51 through 75, but the possibilities for N and the equation (*) restrict these possibilities further.

Since N can be any of 77 through 93, there are exactly 17 possibilities for N. The largest Value of M corresponds to $N=77$ (ie. $M=71$) and the smallest value for M is when $N=93$ (ie. $M=55$). Thus the possibilities for M are 55 through 71, i.e. there are 17 possibilities in total for M, the second smallest mark.

ANSWER:(A)

试卷十五第 20 题：

解：

艾米丽从第二块地砖开始跳跃，每两块地砖着地一次，最后停在倒数第二块地砖上，故地砖的总数为奇数。

第二次是每隔三块地砖着地一次，最后停在第一块地砖上，故地砖上的数字应是 1,4,7,…。这样倒数第二块地砖上的数字为 3 的倍数再加上 1，地砖的总数为 3 的倍数再加上 2。这表明地砖总数不可能是 39,40,49。

最后一次艾米丽从第一块地砖开始跳跃，每隔五块砖着地一次，最后停在倒数第二块地砖上。这又表明地砖的总数为 5 的倍数再加上 2，即为 47 块，故答案为(C)。

Test 15, question 20:

Solution

Since Emily first starts on tile 2 and jumps on every second tile, then she lands only on even numbered tiles. Since she stops on the second last tile, the total number of tiles is odd.

Next, Emily jumps back along the row by 3's and ends on tile 1. So every tile that she lands on this time has a number which is 1 more than a multiple of 3(eg. 1,4,7, etc.) So the second last tile has a number that is 1 more than a multiple of 3. This tells us that the overall number of tiles in the row is 2 more than a multiple of 3.

These two conditions tell us that the total number of tiles cannot be 39,40 or 49.

Lastly Emily jumps by 5's along the row staring at 1. This says each tile that she lands on has a number that is 1 more than a multiple of 5. By the same reasoning as above, the total number of tiles in the row is 2 more than a multiple of 5.

Of the two remaining possibilities (47 and 53), the only one that satisfies this last condition is 47, and so 47 satisfies all 3 of the required conditions.

(Work back through Emily's steps using the fact that she starts with 47 tiles to check that this does work.)

ANSWER: (C)

试卷十六第 16 题：

解：

先考虑四个连续整数 1,2,3,4(其和为 10)，这样就可以排除答案(A)和(B)。6,7,8,9 也是四个连续整数(其和为 30)，这样可以排除答案(C)和(E)，故答案为(D)。

Test 16, question 16:

Solution

Let's look at a couple of examples of four consecutive whole numbers that add to a multiple of 5, and see what possibilities we can eliminate.

First, we can look at 1,2,3,4(whose sum is 10).

Using this example, we can eliminate choise(A)(since the sum ends in a 0) and choice(B)(since the largest number ends in a 4).

With a bit more work, we can see that 6, 7, 8, 9 (whose sum is 30) is another example.

Using this second example, we can eliminate choice (C) (since the smallest number is even) and choice (E)(since none of the numbers ends in a 3).

Therefore, the only remaining choice is (D).

ANSWER: (D)

试卷十六第 17 题：

解：

当卡米拉的 5 美分硬币是 10 美分硬币，而 10 美分硬币是 5 美分硬币时，她多了 1.80 美元。用 10 美分硬币换 5 美分硬币要损失 3 美分，而用 5 美分硬币换 10 美分硬币要增加 5 美分。用 1.80 美分除以 5 美分得到 36，即增加的次数比损失的次数多 36 次，也就是 5 美分硬币比 10 美分硬币多 36 个。这 36 个 5 美分硬币总值为 1.80 美元，而最初 3.60 美元中还有 1.80 美元由相同数量的 5 美分硬币和 10 美分硬币组成。由 $\frac{180}{5+10}=12$，即可知有 12 个 5 美分硬币和 12 个 10 美分硬币。卡米拉的总硬币个数为 $12+12+36=60$，故答案为(D)。

Test 16, question 17:

Solution

When Carmina trades her nickels for dimes and her dimes for nickels, she gains \$1.80. Since trading a dime for a nickel results in a loss of 5 cents, and trading a nickel for a dime results in a gain of 5 cents, then by doing her trade she gains 5 cents in $\frac{180}{5}=36$ more cases than she loses 5 cents. Thus, she must have 36 more nickels than dimes.

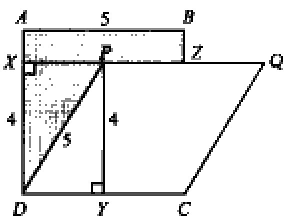
These extra 36 nickels account for \$1.80. So her initial coins are worth \$1.80 and she has an equal number of nickels and dimes. A nickel and dime together are worth 15 cents, so she must have $\frac{180}{15}=12$ sets of a nickel and dime, or 12 nickels and 12 dimes.

So in total, Carmina has 48 nickels and 12 dimes, or 69 coins. ANSWER: (D)

试卷十六第 19 题：

解：

$ABCD$ 为正方形，面积为 25 平方厘米，则边长为 5 厘米。$PQCD$ 是菱形，即也是平行四边形，其面积为底乘以高。从 P 点作 PX 垂直于 AD，作 PY 垂直于 DC，可上阴影部分的面积为长方形 $ABZX$ 和三角形 PXD 两部分。菱形 $PQCD$ 的底边长为 5 厘米，面积为 20 平方厘米，则高 PY 应为 4 厘米。因此可以计算出两个阴影部分的面积分别为 5 平方厘米和 6 平方厘米，其和为 11 平方厘米，故答案为(C)。



Test 16, question 19:

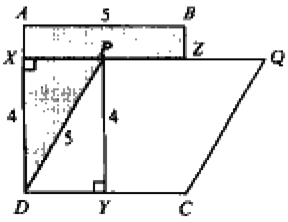
Solution

Since $ABCD$ is a square and has an area of 25 cm^2, then the square has a side length of 5 cm. Since $PQCD$ is a rhombus, then it is a parallelogram, so its area is equal to the product of its base and its height.

Join point P to X on AD so that PX makes a right angle with AD, and to Y on DC so that PY makes a right angle with DC.

Then the area of the shaded region is the area of rectangle $ABZX$ plus the area of triangle PXD. Since the area of $PQCD$ is 20 cm^2 and its base has length 5 cm, then its height, PY, must have length 4 cm.

Therefore, we can now label $DX=4$, $DP=5$ (since $PQCD$ is a rhombus), $AX=1$, and $AB=5$. So $ABZX$ is a 1 by 5 rectangle, and so has area 5 cm^2.



Triangle PXD is right-angled at D, and has $DP=5$ and

试卷十六第 20 题：

解：

由于一对角线上已填有 3 个数 24，12，6，其乘积为 $6\times12\times24=1\ 728$，因此要求横向、纵向及对角线方向上的 3 个数的乘积都为 1 728。

若第一个空格中的数为 N，则有

N	$\frac{1\ 728}{24\ N}$	24
$\frac{1\ 728}{6\ N}$	12	
6		$\frac{1\ 728}{12\ N}$

简化后为

N	$\frac{72}{N}$	24
$\frac{288}{6\ N}$	12	
6		$\frac{144}{N}$

还可以填上其他空格

N	$\frac{72}{N}$	24
$\frac{288}{N}$	12	$\frac{1}{2}N$
6	$2N$	$\frac{144}{N}$

空格中的数均为正整数，即 N，$2N$，$\frac{1}{2}N$，$\frac{72}{N}$，$\frac{144}{N}$和$\frac{288}{N}$都为正整数。

经检查空格中的各个数。N 为整数，$2N$ 也为整数。$\frac{1}{2}N$ 为整数，N 必须为偶数。$\frac{72}{N}$为整数，N 必须为 72 的因子，这样也可以保证$\frac{144}{N}$和$\frac{288}{N}$为整数。72 的因子有 1，2，3，4，6，8，9，12，18，24，36，72，但只有 9 个因子为偶数，故答案为(C)。

$DX=4$, so by Pythagoras' Theorem, $PX=3$. Therefore, the area of triangle PXD is $\frac{1}{2}(3)(4)=6\ \text{cm}^2$.

So, in total, the area of the shaded region is 11 cm^2.

ANSWER: (C)

Test 16, question 20:

Solution

Since all three number on the main diagonal are filled in, we can immediately determine what the product of the entries in any row, column or diagonal is, namely $6\times12\times24=1\ 728$.

We can immediately start to fill in the square by filling in the top-centre, left-centre and bottom-right entries, since we have two entries in each of these rows, columns or diagonals, so the remaining entry is the overall product divided by the two entries already present.

Thus, we obtain

N	$\frac{1\ 728}{24\ N}$	24
$\frac{1\ 728}{6\ N}$	12	
6		$\frac{1\ 728}{12\ N}$

Simplifying, we get

N	$\frac{72}{N}$	24
$\frac{288}{6\ N}$	12	
6		$\frac{144}{N}$

In a similar way, we can fill in the two remaining entries to get

N	$\frac{72}{N}$	24
$\frac{288}{N}$	12	$\frac{1}{2}N$
6	$2N$	$\frac{144}{N}$

Now we are told that each of the nine entries is a positive integer, so each of N, $2N$, $\frac{1}{2}N$, $\frac{72}{N}$, $\frac{144}{N}$, *and* $\frac{288}{N}$ is a positive integer.

Do we need to check each of these conditions?

Well, if N is an integer, then $2N$ is an integer, so we don't need to check this second condition.

The fact that $\frac{1}{2}N$ is an integer tells us that N has to be an even integer.

The fact that $\frac{72}{N}$ is an integer tells us that N is a factor of 72.

The fact that $\frac{144}{N}$ is an integer tells us that N is a factor of 144, but since N is already a factor of 72 and $144 = 2 \times 72$, then N being a factor of 72 tells us that N is a factor of 144.

Similarly, N being a factor of 72 tells us that N is a factor of 288, so $\frac{288}{N}$ is an integer.

In summary, we are looking for positive integers N which are even and factors of 72.

Writing out the positive factors of 72, we get 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72, of which nine are even.

ANSWER: (C)

试卷十七第 14 题：

解：

CAT 和 CAR 的数值分别为 8 和 12，R 的值必定比 T 的值大 4，因此 BAR 的值也应比 BAT 的值大 4，所以 BAR 的值为 10，故答案为(A)。

Test 17, question 14:

Solution

Since the numrical values of CAT and CAR are 8 and 12, then the value of R must be 4 more than the value of T.

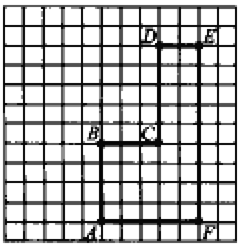
Therefore, the value of BAR is 4 more than the value of BAT, so BAR has a numerical value of 10.

ANSWER: (A)

试卷十七第 15 题：

解：

根据勾股定理，按如图所示的尺寸进行计算：



$AE = \sqrt{5^2 + 9^2}$
$= \sqrt{106} \approx 10.30$

$CF = \sqrt{2^2 + 4^2}$
$= \sqrt{20} \approx 4.47$

$CD + CF \approx 5 + 4.47$
$= 9.47$

$AC = \sqrt{3^2 + 4^2}$
$= \sqrt{25} = 5$

$AC + CF \approx 5 + 4.47$
$= 9.47$

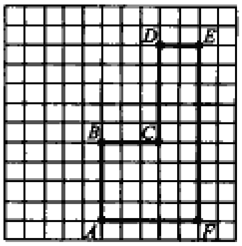
$FD = \sqrt{2^2 + 9^2}$
$= \sqrt{85} \approx 9.22$

$CE = \sqrt{2^2 + 5^2}$

Test 17, question 15:

Solution

To get from A to E, we go right 5 and up 9, so



$AE = \sqrt{5^2 + 9^2}$
$= \sqrt{106}$
$\approx 10.30,$

by the Pythagorean Theorem.

To get from C to F, we go right 2 and down 4, so

$CF = \sqrt{2^2 + 4^2}$
$= \sqrt{20}$
$\approx 4.47,$

and so $CD + CF \approx 5 + 4.47$
$= 9.47.$

To get from A to C, we go right 3 and up 4, so

$AC = \sqrt{3^2 + 4^2}$
$= \sqrt{25}$

$=\sqrt{29}\approx5.39$

$AC+CE\approx5+5.39$

$=10.39$

因此 $AC+CE$ 最长，故答案为(E)。

试卷十七第 19 题：

解：

x 是数 ABC，可表示为 $x=100A+10B+C$，

y 是数 CBA，可表示为 $y=100C+10B+A$，

$x-y=495$，即

$$(100A+10B+C)-(100C+10B+A)=495$$
$$99A-99C=495$$
$$A-C=5$$

但对 B 没有限制，而 B 可以取 0 至 9 十个数，A 和 C 则可分别为 6 和 1，7 和 2，8 和 3，9 和 4。因此 x 的值有 40 个可能性，故答案为(B)。

试卷十七第 20 题：

解：

考虑一长方体有 11 行、10 列和 n 层。将 $2\times1\times1$ 的小块在行的方向上放置一共有 $(11-1)\times10\times n$ 个位置，将小块在列的方向上放置一共有 $11\times(10-1)\times n$ 个位置，将小块在层的方向上放置一共有 $11\times10\times(n-1)$ 个位置。根据题意有：

$=5$, and so $AC+CF$

$\approx5+4.47=9.47$.

To get from F to D, we go left 2 and up 9, so

$FD=\sqrt{2^2+9^2}=\sqrt{85}\approx9.22$.

To get from C to E, we go right 2 and up 5, so

$CE=\sqrt{2^2+5^2}=\sqrt{29}\approx5.39$, and so $AC+CE$

$\approx5+5.39=10.39$.

Therefore, the longest of these five lengths is $AC+CE$. ANSWER: (E)

Test 17, question 19:

Solution

Since x has digits ABC, then $x=100A+10B+C$.

Since y has digits CBA, then $y=100C+10B+A$.

Since $x-y=495$, then

$$(100A+10B+C)-(100C+10B+A)=495$$
$$99A-99C=495$$
$$99(A-C)=495$$
$$A-C=5$$

and there is no restriction on B.

Thus, there are 10 possibilities for B (0 through 9) and for each of these possibilities we could have A and C equal to 6 and 1, 7 and 2, 8 and 3, or 9 and 4. (For example, $873-378=495$.)

Therefore, there are 40 possibilities for x.

ANSWER: (B)

Test 17, question 20: .

Solution

Consider the block as n layers each having 11 rows and 10 columns.

First, we consider positions of the 2 by 1 by 1 block which are entirely contained in one layer. In each layer, there are 9 possible positions for the 2 by 1 by 1 block in each row (crossing columns 1 and 2, 2 and 3, 3 and 4, and so on, up to 9 and 10), and there are 10 possible positions in each column (crossing rows 1 and 2, 2 and 3, 3 and 4, and so on, up to 10 and 11). Therefore, within each layer, there are $11(9)+10(10)=199$ positions for the 2 by 1 by 1 block. In the large block, there are thus $199n$ positions of this type

$$(11-1)\times 10\times n+11\times(10-1)\times n+11\times 10\times(n-1)=2\ 362$$

$$100n+99n+110n-110=2\ 362$$

$$309n=2\ 472$$

$$n=8$$

故答案为(B)。

for the 2 by 1 by 1 block, since there are n layers.

Next, we consider positions of the 2 by 1 by 1 block which cross between two layers. Since each layer has 110 blocks (in 11 rows and 10 columns) the there are 110 positions for the 2 by 1 by 1 block between each pair of touching layers. Since there are $n-1$ pairs of touching layers, then there are $110(n-1)$ positions of this type.

Thus, overall we have 2 362 total positions, so

$$199n+110(n-1)=2\ 362$$

$$309n-110=2\ 362$$

$$309n=2\ 472$$

$$n=8$$

ANSWER: (B)

第三部分　试题参考答案

试卷一	试卷二	试卷三	试卷四	试卷五	试卷六	试卷七	试卷八	试卷九
1.A	1.B	1.C	1.D	1.B	1.C	1.B	1.C	1.C
2.D	2.B	2.A	2.B	2.B	2.A	2.A	2.C	2.D
3.B	3.E	3.B	3.B	3.C	3.C	3.E	3.E	3.D
4.B	4.A	4.E	4.D	4.C	4.E	4.A	4.B	4.A
5.E	5.A	5.A	5.A	5.A	5.B	5.E	5.E	5.B
6.A	6.E	6.B	6.D	6.C	6.B	6.E	6.D	6.A
7.B	7.E	7.D	7.E	7.A	7.E	7.B	7.D	7.D
8.C	8.B	8.C	8.A	8.C	8.B	8.A	8.B	8.D
9.A	9.D	9.B	9.A	9.C	9.A	9.C	9.B	9.D
10.D	10.E	10.B	10.C	10.C	10.B	10.B	10.A	10.C
11.A	11.D	11.A	11.A	11.B	11.D	11.A	11.D	11.A
12.C	12.D	12.A	12.C	12.A	12.C	12.E	12.A	12.A
13.C	13.E	13.A	13.B	13.D	13.E	13.C	13.B	13.B
14.E	14.E	14.C	14.A	14.E	14.B	14.E	14.D	14.A
15.B	15.E	15.E	15.D	15.C	15.D	15.E	15.B	15.A
16.A	16.B	16.B	16.B	16.B	16.A	16.B	16.E	16.E
17.B	17.A	17.D	17.B	17.E	17.A	17.E	17.C	17.A
18.A	18.B	18.B	18.D	18.E	18.E	18.B	18.E	18.E
19.D	19.D	19.D	19.B	19.B	19.B	19.A	19.E	19.B
20.A	20.A	20.E	20.A	20.A	20.D	20.D	20.D	20.A

试卷十	试卷十一	试卷十二	试卷十三	试卷十四	试卷十五	试卷十六	试卷十七
1.E	1.B	1.E	1.A	1.D	1.B	1.A	1.E
2.B	2.A	2.A	2.E	2.B	2.A	2.C	2.C
3.B	3.C	3.B	3.C	3.D	3.E	3.C	3.B
4.B	4.E	4.D	4.D	4.A	4.E	4.A	4.A
5.D	5.E	5.D	5.C	5.C	5.C	5.D	5.D
6.B	6.C	6.D	6.D	6.D	6.B	6.E	6.B
7.D	7.A	7.C	7.D	7.C	7.A	7.D	7.C
8.B	8.D	8.E	8.B	8.E	8.D	8.B	8.B
9.C	9.A	9.B	9.E	9.C	9.D	9.B	9.A
10.A	10.C	10.A	10.A	10.E	10.B	10.A	10.A
11.B	11.C	11.A	11.B	11.C	11.B	11.B	11.E
12.B	12.A	12.C	12.E	12.E	12.A	12.E	12.A
13.D	13.E	13.C	13.D	13.A	13.E	13.A	13.D
14.B	14.B	14.E	14.B	14.D	14.C	14.C	14.D
15.A	15.B	15.D	15.D	15.B	15.E	15.D	15.A
16.C	16.A	16.B	16.A	16.B	16.A	16.E	16.C
17.D	17.E	17.A	17.A	17.E	17.A	17.D	17.E
18.E	18.D	18.B	18.B	18.A	18.C	18.B	18.C
19.E	19.B	19.A	19.C	19.A	19.D	19.E	19.E
20.B	20.D	20.C	20.E	20.E	20.B	20.C	20.C

第三部分 试题讲解

Solutions of partial questions

试卷十一第 12 题：

解：

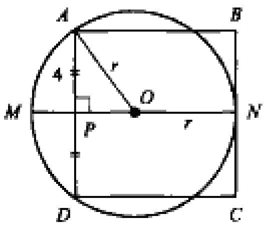
要使 N 是一个完全立方数，则 N 的每一个质数因子的幂都必须被 3 除尽。因为 p 和 q 必须是正整数，所以 p 的最小值为 2，q 的最小值为 3，$p+q$ 的最小值为 5，故答案为(A)。

试卷十一第 15 题：

解：

设 r 为圆的半径，O 为圆心，作直径 MN，垂直平分弦 AD，并与其交于 P 点，连接 OA。

$\triangle OAP$ 为直角三角形，$\angle APO=90°$。因为 AP 是正方形 $ABCD$ 边长的一半，所以 $AP=4$，$OA=r$，$PO=PN-ON=8-r$。



根据勾股定理，我们得出

$$r^2=4^2+(8-r)^2$$
$$r^2=16+64-16r+r^2$$
$$16r=80$$
$$r=5$$

即圆的半径为 5，故答案为(B)。

Test 11, question 12:

Solution

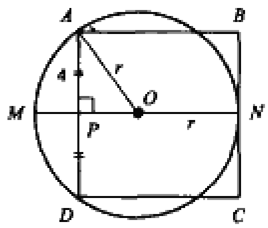
In order for N to be a perfect cube, each prime factor of N must have an exponent that is divisible by 3. Since p and q must be positive integers, the smallest value of p is 2 and the smallest value of q is 3. Thus, the smallest value of $p+q$ is 5. ANSWER: (A)

Test 11, question 15:

Solution

Let r represent length of the radius and let O represent the centre of the circle. Draw diameter MN that bisects chord AD perpendicularly at P. Join OA.

$\triangle OAP$ is a right-angled triangle with $\angle APO=90°$. The length of AP is 4, since it is half of a side of square $ABCD$. The length of OA is r, and the length of PO is $PN-ON=8-r$.



Using the Pythagorean Theorem we get

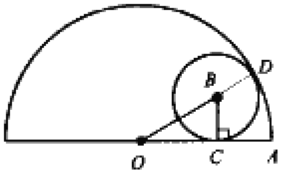
$$r^2=4^2+(8-r)^2$$
$$r^2=16+64-16r+r^2$$
$$16r=80$$
$$r=5$$

Thus, the radius of the circle is 5. ANSWER: (B)

试卷十一第 17 题：

解：

作$\triangle OBC$，O 是大圆的圆心，B 是轮子的圆心，C 是轮子与半圆直径相切的点。因为 BC 为轮子的半径，所以$\angle OCB = 90°$，$\triangle OBC$ 的 C 为直角。



将 OB 延长与半圆相交于 D 点。因为 BD 和 BC 都是轮子的半径，所以 $BD = BC = 8$，$OB = 25 - 8 = 17$

在$\triangle OBC$ 中根据勾股定理得出 OC：

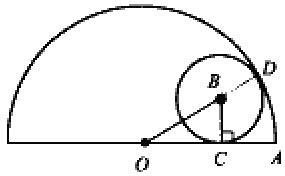
$$OC^2 = 17^2 - 8^2$$
$$OC^2 = 225$$
$$OC = 15$$

因此 $AC = 25 - 15 = 10$，轮子不能接触到的直径长度为 $2AC$ 的长度或 20，故答案为(E)。

Test 11, question 17:

Solution

Draw $\triangle OBC$, where O is the centre of the large circle, B is the centre of the wheel, and C is the point of tangency of the wheel and the diameter of the semicircle. Since BC is a radius of the wheel, $\angle OCB = 90°$ and $\triangle OBC$ is right-angled at C.



Extend OB to meet the semicircle at D. Then $BD = BC = 8$, since they are both radii of the wheel, and $OB = 25 - 8 = 17$.

Use the Pythagorean Theorem in $\triangle OBC$ to find OC.

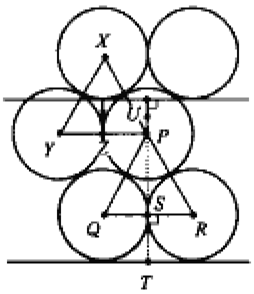
$$OC^2 = 17^2 - 8^2$$
$$OC^2 = 225$$
$$OC = 15$$

Then $AC = 25 - 15 = 10$. The length of the portion of the diameter that cannot be touched by the wheel is a length equivalent to $2AC$ or 20. ANSWER: (E)

试卷十一第 20 题：

解：

每隔一排去掉 1 个球，把它按照图中所示的排列方法摆放。由于每个圆的直径为 1，所以$\triangle PQR$ 和$\triangle PXY$ 均为等边三角形，且边长为 1。



在$\triangle PQR$ 中，高 PS 平分 QR，根据勾股定理得出 PS

$$PS^2 = 1^2 - (\frac{1}{2})^2 = \frac{3}{4}$$

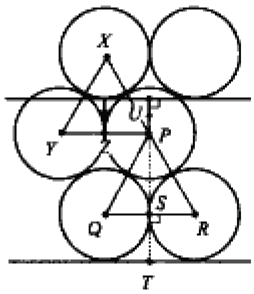
$$PS = \frac{\sqrt{3}}{2}$$

同理，$XZ = \frac{\sqrt{3}}{2}$

Test 11, question 20:

Solution

Remove one circle from every second row and shift to form the given configuration. Label the diagram as shown. Since each circle has diameter 1, $\triangle PQR$ and $\triangle PXY$ are equilateral triangles with sides of length 1.



In $\triangle PQR$, altitude PS bisects side QR. Use the Pythagorean Theorem to find PS.

$$PS^2 = (1)^2 - (\frac{1}{2})^2 = \frac{3}{4}$$

$$PS = \frac{\sqrt{3}}{2}$$

因为圆的半径均为$\frac{1}{2}$，则 $PU=\frac{\sqrt{3}}{2}-\frac{1}{2}$，$TU=\frac{1}{2}+\frac{\sqrt{3}}{2}+\left(\frac{\sqrt{3}}{2}-\frac{1}{2}\right)=\sqrt{3}$。

这说明在摆放第三排圆之前，两排圆需要的高度为$\sqrt{3}$

因为$\frac{100}{\sqrt{3}}=57.7$，因此晃动后，100 排圆增加为 114 排，每排圆的数量为 $100+99=199$。

114 排的高度为$\frac{114}{2}\times\sqrt{3}\approx98.7<99$，因此在 114 排上面还可以再放一排 100 个圆。这样可放的圆的个数为 $57\times199+100=11\ 443$。多放的圆为 $11\ 443-10\ 000=1\ 443$，故答案为(D)。

Also, $XZ=\frac{\sqrt{3}}{2}$

Since all radii have length $\frac{1}{2}$, then $PU=\frac{\sqrt{3}}{2}-\frac{1}{2}$ and $TU=\frac{1}{2}+\frac{\sqrt{3}}{2}+\left(\frac{\sqrt{3}}{2}-\frac{1}{2}\right)=\sqrt{3}$. This tells us that two rows of circles require a height of $\sqrt{3}$ before a third row begins.

Since $\frac{100}{\sqrt{3}}=57.7$, we can pack 57 double rows, each containing $100+99=199$ circles.

Can we pack one final row of 100 circles? Yes. The square has sides of length 100 and our configuration of 57 double rows requires a height of $57\sqrt{3}$ before the next row begins. Since $100-57\sqrt{3}>1$, and since the circles each have diameter 1, there is room for one final row of 100 circles.

The number of circles used in this new packing is

$$57(199)+100=11\ 443$$

Thus, the maximum number of extra circles that can be packed into the square is

$11\ 443-10\ 000=1\ 443$. ANSWER: (D)

试卷十二第 16 题：

解：

用数字 1 至 9 可以组成 $9\times8=72$ 对数，另外还有一个数不能配对。假设这个不能配对的数为 9，则有：98 97 96 95 94 93 92 91 87 86 85 84 83 82 81 76 75 74 73 72 71 65 64 63 62 61 54 53 52 51 43 42 41 32 31 21 9，即一共有 73 个数，故答案为(B)。

Test 12, question 16:

Solution

Since there are $9(8)=72$ ordered pairs of consecutive digits, and since the final digit has no successor, we can construct a 73 digit number by adding a 9. The question is, of course, can we actually construct this number? The answer is 'yes' and the largest such number is,

98 97 96 95 94 93 92 91 87 86 85 84 83 82 81 76 75 74 73 72 71 65 64 63 62 61 54 53 52 51 43 42 41 32 31 21 9.

If we count the numbers in the string we can see that there are actually 73 numbers contained within it.

ANSWER: (B)

试卷十二第 17 题：

解：

在 MP 上选一个点 R，使 $RPQN$ 为长方形，

因此，$MR=105-55=50$

应用勾股定理：$RN=\sqrt{130^2-50^2}=120$

作以 PQ 为轴的点 N 的对称点 S，连接 MT、TS、

Test 12, question 17:

Solution

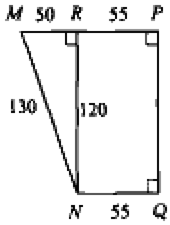
We start by choosing point R so that $RPQN$ is a rectangle. Thus, $MR=105-55=50$.

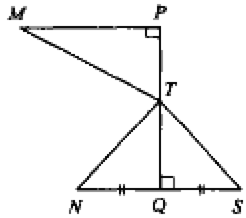
Using Pythagoras Theorem, $RN=\sqrt{130^2-50^2}=120$.

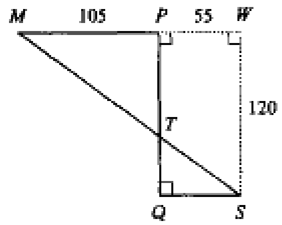
TN。因为$\triangle TNQ \cong \triangle TSQ$，所以 $TN = TS$ 且$MT + TN = MT + TS$。
很显然当 M、T 和 S 共线时，$MT + TS$ 的长度最小。
这时，$MT + TS = MS$。
如图作$\triangle MSW$，根据勾股定理：

$$\begin{aligned} MS &= \sqrt{160^2 + 120^2} \\ &= 200 \end{aligned}$$

即最短距离是 200 米，故答案为(A)。





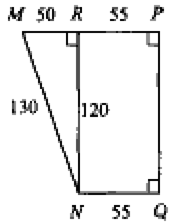


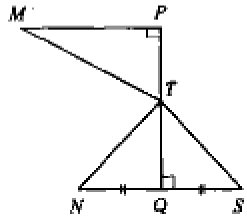
试卷十二第 18 题：

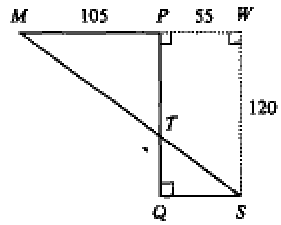
解：

因为数组中的每一个数都可以表示为 $1 + 3n$，$n = 1,2,3,\cdots,15$，所以任何三个数的和则可以表示为 $3 + 3k + 3l + 3m$，k、l、m 从$\{1,2,3,\cdots,15\}$中选取。这样最小的整数为 $1 + 2 + 3 = 6$，最大的整数则为$13 + 14 + 15 = 42$。因此组成的介于 6 到 42 之间的整数一共有 37 个，故答案为(B)。

Let S be the image of N reflected in PQ.
Join M to T, T to S and T to N.
Since $\triangle TNQ \cong \triangle TSQ$, it follows that $TN = TS$.
The length of the supply line is $MT + TN = MT + TS$.
Clearly the length $MT + TS$ is a minimum when M, T and S are collinear. In that case, $MT + TS = MS$.
Create $\triangle MSW$ as shown.
By Pythagoras Theorem, $MS = \sqrt{160^2 + 120^2} = 200$.
ANSWER: (A)







Test 12, question 18:

Solution

Since each number is of the form $1 + 3n$, $n = 1, 2, 3, \cdots, 15$, the sum of the three numbers will be of the form $3 + 3k + 3l + 3m$ where k, l and m are chosen from $\{1,2,3,\cdots,15\}$. So the question is equivalent to the easier question of, 'How many distinct integers can be formed by adding three numbers from, $\{1, 2, 3, \cdots, 15\}$?'
The smallest is $1 + 2 + 3 = 6$ and the largest is 13 +

$14+15=42$.

It is clearly possible to get every sum between 6 and 42 by:

(a) increasing the sum by one replacing a number with one that is 1 larger or ,

(b) decreasing the sum by one by decreasing one of the addends by 1.

Thus all the integers from 6 to 42 inclusive can be formed.

This is the same as asking, 'How many integers are there between 1 and 37 inclusive?' The answer, of course, is 37. ANSWER: (B)

试卷十二第 20 题:

解:

若 $a^2+b^3+c^5=d^7, a=3^p, b=3^q, c=3^r, d=3^s$，则有

$$3^{2p}+3^{3q}+3^{5r}=3^{7s}$$

$$3^{2p}(1+3^{3q-2p}+3^{5r-2p})=3^{7s}$$

上式中左边的各因子都必须为 3 的倍数。但若要使 $1+3^{3q-2p}+3^{5r-2p}$ 为 3 的倍数,则只能是 $3^{3q-2p}=3^{5r-2p}=1, 3q-2p=5r-2p=0$,

或 $2p=3q=5r$,其最小公倍数为 30

因此:$3^{2p}+3^{2p}+3^{2p}=3^{7s}$

$$3.3^{2p}=3^{7s}$$

$$3^{2p+1}=3^{7s}$$

$$2p+1=7s$$

取 $p=15,30,45,\cdots$ 可见当 $p=45$ 时, $s=13$,这时 $q=30, r=18$。$p+q+r+s=45+30+18+13=106$,故答案为(C)。

Test 12. question 20:

Solution

If we rewrite the given expression by substituting we arrive at the new expression $3^{2p}+3^{3q}+3^{5r}=3^{7s}$. (This is derived by replacing a with 3^p, b with 3^q and so on.)

On the left side we remove the lowest power of 3 (whatever it is), $3^{2p}(1+3^{3q-2p}+3^{5r-2p})=3^{7s}$.

Both factors on the left side must be multiples of 3 but $1+3^{3q-2p}+3^{5r-2p}$ cannot be a multiple of 3 unless 3^{3q-2p} and 3^{5r-2p} are both exactly 1. This means that $2p=3q=5r$ or that the exponents are themselves multiples of 30, say $30m$.

We now have, $3^{30m}+3^{30m}+3^{30m}=3^{7s}$

or, $$(3)(3^{30m})=3^{7s}$$

$$3^{30m+1}=3^{7s}.$$

We are now looking for the smallest integers, m and s, such that $30m+1=7s$.

If we try $m=1,2,3,4,\ldots$ we find that $m=3$ and $s=13$. Thus $2p=90$, $p=45$, $3q=90$, $q=30$, $5r=90$, $r=18$ and $7s=91$, $s=13$.

From this, $p+q+r+s=45+30+18+13=106$.

ANSWER: (C)

试卷十三第 13 题:

解:

16 可以分解为 $16=1\times2\times8$,这样 3 个数(因子)也不相同,从 1,2,8 中选不同的 a、b、c 值,计算

Test 13, question 13:

Solution

If a, b and c are distinct then the correct factorization is $16=1\times2\times8$. Since a, b and c must

$a^b - b^c + c^a$有 $-247, -61, 65, 249, 263$ 和 63 六个值，最大的为 $8^1 - 1^2 + 2^8 = 263$，故答案为(D)。

be some permutation of 1, 2 and 8 there are exactly six possibilities which give the values -247, -61, 65, 249, 263, and 63. Of these, $8^1 - 1^2 + 2^8$ or 263 is the largest.

ANSWER: (D)

试卷十三第 14 题：

解：

如图所示，圆鼓转动后，C 点将移动到 C' 点。

金属杆为圆鼓的切线，因此 $\angle ACO = \angle DC'O = \angle AMO = 90°$。

$\angle COM = 360° - 90° - 90° - 30° = 150°$

同样，$\angle C'OM = 150°$

因此，$\angle C'OC = 360° - 150° - 150° = 60°$

这表明，C 点移动了 $\frac{1}{6}$ 圆周长，即 $\frac{1}{6} \times 12\pi = 2\pi$，故答案为(B)。

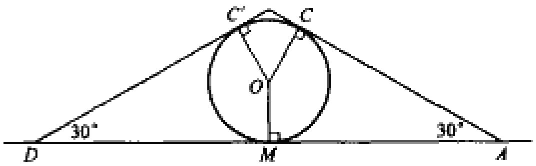
Test 13, question 14:

Solution

The drum rolls so that point C moves to C'.

Since a line drawn from the centre of the circle makes angles of 90° with tangents drawn to a circle, $\angle COM = 360° - 90° - 90° - 30° = 150°$. By symmetry, $\angle C'OM = 150°$ and thus $\angle C'OC = 360° - 150° - 150° = 60°$. Since $\angle C'OC = 60°$, this implies that point C will have to travel $\frac{1}{6}$th the circumference of the circle or $\frac{1}{6} \times 12\pi = 2\pi$.

ANSWER: (B)



试卷十三第 18 题：

解：

17 的两位数的倍数有 17, 34, 51, 68 和 85, 23 的两位数的倍数有 23, 46, 69 和 92。第一位数是 3，因此前两位数字只能是 34，第二位数是 4。同理第三位数只能是 6，但第四位数可能是 8 或 9。

若第四位数是 8，这个数将是 3 468 517，因为没有一个两位数是以 7 开头的，所以后面不能再接任何数。若第四位数是 9，这个数将是 346 923 469 234…，即“34 692”循环。考虑一个有 2 000 位数的数，前 1 995位数都是 34 692 循环，最后 5 位数是 34 692，也可以是 34 685(注：这时可以用 85 代替 92)，所以最后一位数可能是 2 或 5，$a + b = 2 + 5 = 7$，故答案为(B)。

Test 13, question 18:

Solution

We start by noting that the two-digit multiples of 17 are 17, 34, 51, 68, and 85. Similarly we note that the two-digit multiples of 23 are 23, 46, 69, and 92. The first digit is 3 and since the only two-digit number in the two lists starting with 3 is 34, the second digit is 4. Similarly the third digit must be 6. The fourth digit, however, can be either 8 or 9. Let's consider this in two cases.

Case 1

If the fourth digit is 8, the number would be 3 468 517 and would stop here since there isn't a number in the two lists starting with 7.

Case 2

If the fourth digit is 9, the number would be 346 923 469 234 … and the five digits '34692'

would continue repeating indefinitely as long as we choose 9 to follow 6.

If we consider a 2 000 digit number, its first 1995 digits must contain 399 groups of '34 692'. The last groups of five digits could be either 34 692 or 34 685 which means that the 2 000th digit may be either 2 or 5 so that $a+b=2+5=7$.

ANSWER: (B)

试卷十三第 20 题:

解:

根据题意,有: $x^2+x^2y^2+x^2y^4=525$ (1)

$$x+xy+xy^2=35 \quad (2)$$

(1)式的左边可以写成: $x^2+x^2y^2+x^2y^4=(x+xy^2)^2-x^2y^2=(x+xy^2-xy)(x+xy^2+xy)$

即 $(x+xy^2-xy)(x+xy^2+xy)=525$

结合(2)式,有:

$$35(x+xy^2-xy)=525$$

$$x+xy^2-xy=15 \quad (3)$$

用(2)式减(3)式,得 $2xy=20, x=\frac{10}{y}$

代入(3)式,有:

$$\frac{10}{y}+10y-10=15$$

$$10y^2-25y+10=0$$

$$(2y-1)(y-2)=0$$

$$y_1=\frac{1}{2} \text{或} y_2=2$$

$y_1+y_2=\frac{5}{2}$,故答案为(E)。

Test 13, question 20:

Solution

Consider the system of equations

$$x^2+x^2y^2+x^2y^4=525 \quad (1)$$

and $x+xy+xy^2=35$ (2)

The expression on the left side of equation (1) can be rewritten as,

$$x^2+x^2y^2+x^2y^4=(x+xy^2)^2-x^2y^2$$
$$=(x+xy^2-xy)(x+xy^2+xy)$$

Thus, $(x+xy^2-xy)(x+xy^2+xy)=525$

Substituting from (2) gives, $(x+xy^2-xy)(35)=525$

or, $x+xy^2-xy=15$ (3)

Now subtracting (3) from (2), $2xy=20, x=\frac{10}{y}$

Substituting for x in (3) gives,

$$\frac{10}{y}+10y-10=15$$

$$10y^2-25y+10=0$$

$$2y^2-5y+2=0$$

$$(2y-1)(y-2)=0$$

$$y=\frac{1}{2} \text{ or } y=2$$

The sum of the real y values satisfying the system is $\frac{5}{2}$.

ANSWER: (E)

试卷十四第 18 题:

解:

如图所示,大圆的圆心为 $A(5,3)$ 小圆的圆心为 $B(2,-1)$。从 A 到 B 作连线,并延长与小圆交于 C 点,与大圆交于 D 点。CD 即为两圆间的最小距离。

Test 14, question 18:

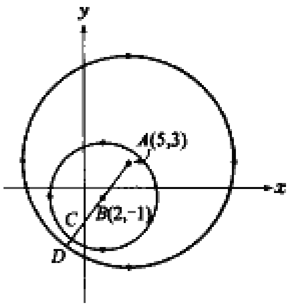
Solution

We start by drawing the two circles where the larger circle has centre $A(5,3)$ and the smaller circle has centre $B(2,-1)$. A line is drawn from A, through B to meet the circumference of the small circle at C and the circumference of the larger circle at D. The

$AB=\sqrt{[3-(-1)]^2+(5-2)^2}=\sqrt{16+9}=5$

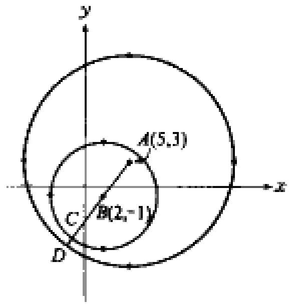
$CD=AD-(AB+BC)$
$=12-(5+6)$
$=1$

故答案为(A)。



length CD is the desired length. The length from A to D is given to be 12 and the length from B to C is 6. We calculate the length of AB to be, $\sqrt{[3-(-1)]^2+(5-2)^2}=\sqrt{16+9}=5$. To find CD, we calculate as follows,

$$CD=AD-(AB+BC)$$
$$=12-(5+6)$$
$$=1$$



ANSWER: (A)

试卷十四第19题:

解:

设大圆柱的高度为 h_1,小圆柱的高度为 h_2, $x=h_1+h_2$,瓶子正立时没有盛水的高度为 $x-20$,体积为 $\pi\times1^2\times(x-20)$。

倒置后,没有盛水的高度为 $x-28$,体积为 $\pi\times3^2\times(x-28)$。

因为两种情况下没有盛水的体积应相等,因此有:

$$\pi\times1^2\times(x-20)=\pi\times3^2\times(x-28)$$
$$x-20=9x-252$$
$$8x=272$$
$$x=29$$

即瓶子的总高度为29,故答案为(A)。

Test 14, question 19:

Solution

We'll start by representing the height of the large cylinder as h_1 and the height of the small cylinder as h_2. For simplicity, we'll let $x=h_1+h_2$.

If the bottom cylinder is completely filled and the top cylinder is only partially filled the top cylinder will have a cylindrical space that is not filled. This cylindrical space will have a height equal to $x-20$ and a volume equal to, $\pi(1)^2(x-20)$.

Similarly, if we turn the cylinder upside down there will be a cylindrical space unfilled that will have a height equal to $x-28$ and a volume equal to, $\pi(3)^2(x-28)$.

Since these two unoccupied spaces must be equal, we then have,

$$\pi(1)^2(x-20)=\pi(3)^2(x-28)$$
$$x-20=9x-252$$
$$8x=272$$
$$x=29.$$

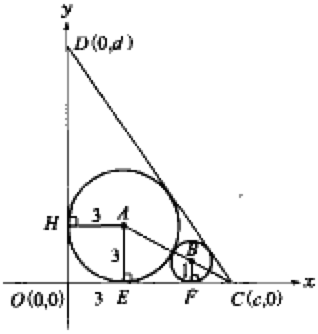
Therefore, the total height is 29.

ANSWER: (A)

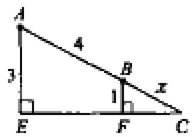
试卷十四第 20 题：

解：

由于两个圆都与三角形的两条边相切，所以三角形的顶点 C 与圆心 A 和 B 在同一直线上。连接 A、B、C，从 A 点和 B 点向 x 轴作垂线，分别交于 E 点和 F 点。从 A 点向 y 轴作垂线，交于 H 点，因此有 $AH = AE = 3$。

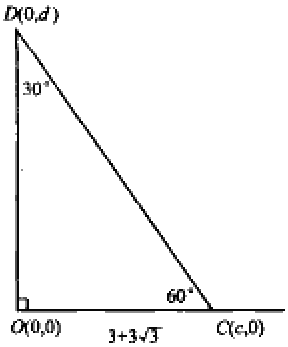


取 $\triangle AEC$ 作进一步分析，设 $BC = x$，因 $\triangle CBF \backsim \triangle CAE$，因此有



$$\frac{x}{1} = \frac{x+4}{3}$$

$$x = 2$$



在 $\triangle CBF$ 中，$FC^2 = 2^2 - 1^2 = 3$

$$FC = \sqrt{3} \quad (FC > 0)$$

因此，$\angle BCF = 30°$，$\angle OCD = 60°$，$EF = 2\sqrt{3}$

因此，$d = \sqrt{3}(3 + 3\sqrt{3})$

$= 3\sqrt{3} + 9$

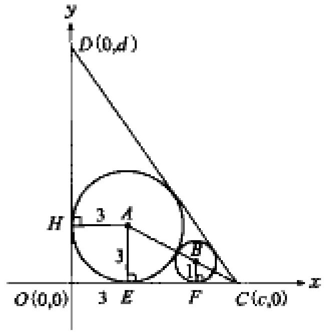
故答案为(E)。

Test 14, question 20:

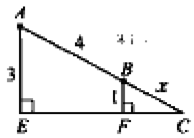
Solution

We start by drawing a line from point C that will pass through A and B. From A and B, we drop perpendiculars to the points of tangency on the x-axis and label these points as E and F as shown. We also drop a perpendicular from A to the y-axis which makes $AH = AE = 3$.

Extracting $\triangle CEA$ from the diagram and labelling with the given information we would have the following noted in the diagram.

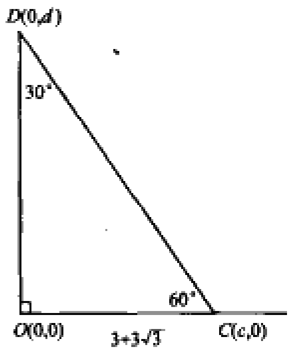


If we represent the distance from C to B as x and recognize that $\triangle CBF$ is similar to $\triangle CAE$,



$$\frac{x}{1} = \frac{x+4}{3}$$

$$x = 2.$$



In $\triangle CBF$, $FC^2 = 2^2 - 1^2 = 3$

$$FC = \sqrt{3}, (FC > 0).$$

This implies that $\angle BCF = 30°$ and $\angle OCD = 60°$. Therefore $EF = 2\sqrt{3}$, from similar triangles again. This now gives us the diagram shown.

Thus, $d = \sqrt{3}(3+3\sqrt{3})$
$= 3\sqrt{3}+9.$
ANSWER: (E)

试卷十五第 17 题：

解：

连续整数的和等于这些连续整数的平均值乘以连续整数的个数。设 N 为连续整数的个数，A 为连续整数的平均值，则 $NA=75$。另外，N 应小于 12，因为 1 至 12 的和已经达到 78。

若 N 为奇数，A 是连续整数的中间值。因为 $NA=75$，N 则必须是 75 的奇数因子，且大于 1，小于 12，因此只能是 3 或 5。这时分别有：$24+25+26=75$，$13+14+15+16+17=75$。

若 N 为偶数，A 则介于两个连续整数之间，设 $N=2k$，$A=\frac{2l+1}{2}$，式中 k 和 l 均为整数，则

$$2k\left(\frac{2l+1}{2}\right)=75$$
$$k(2l+1)=75$$

因此 k 是 75 的因子，可为 1,3,5。$N=2k$，则可为 2,6,10。这时分别有 $37+38=75$，$10+11+12+13+14+15=75$，$3+4+5+6+7+8+9+10+11+12=75$，因此一共有 5 种方法，故答案为(E)。

Test 15, question 17:

Solution

When we add up a number of consecutive integers, the sum of these integers will be equal to the number of integers being added times the average of the integers being added.

Let N be the number of consecutive integers being added, and let A be the average of the consecutive integers being added. Thus, $NA=75$.

Before we determine the possibilities for N, we make the observation that N must be less than 12, since the sum of the first 12 positive integers is 78, and thus the sum of any 12 or more consecutive positive integers is at least 78.

Case 1: N is odd.

In this case, A (the average) is an integer (there is a "middle number" among the integers being added). Therefore, since $NA=75$, N must be an odd positive factor of 75 which is bigger than 1 and less than 12, ie. N is one of 3 or 5. So there are two possibilities when N is odd, namely $24+25+26=75$ and $13+14+15+16+17=75$.

Case 2: N is even.

In this case A will be half - way between two integers.

Set $N=2k$ and $A=\frac{2l+1}{2}$, where k and l are integers. Then

$$2k\left(\frac{2l+1}{2}\right)=75$$
$$k(2l+1)=75$$

Thus k is a factor of 75, and so $N=2k$ is 2 times a factor of 75, ie. N could be 2, 6 or 10. So the possibilities here are $37+38=75$, $10+11+12+13+14+15=75$, and

$3+4+5+6+7+8+9+10+11+12=75.$

So there are 5 ways in total.

ANSWER: (E)

试卷十五第 18 题：

解：

在$\triangle AFB$中，根据勾股定理，有

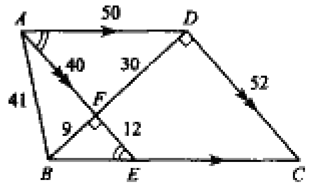
$$AF^2+9^2=41^2$$
$$AF=40$$

同理，$FD=30$

由于，$AD \parallel BC$，$\angle FAD=\angle FEB$，所以$\triangle AFD \backsim \triangle EFB$，则

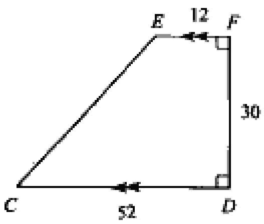
$$\frac{AE}{FD}=\frac{EF}{FB}\text{或}\frac{40}{30}=\frac{EF}{9}\text{或 }EF=12$$

由于 $AE \perp BD$，$DC \perp BD$，所以 $AE \parallel DC$，即 $AECD$ 为平行四边形，$DC=AE=52$。



再考虑四边形 $FECD$，这一四边形为梯形，因此：

$$FECD\text{ 的面积}=\frac{1}{2}(EF+CD)(FD)$$
$$=\frac{1}{2}\times(12+52)\times 30$$
$$=960$$



故答案为(C)。

Test 15, question 18:

Solution

By Pythagoras in $\triangle AFB$,

$$AF^2+9^2=41^2$$
$$AF=40$$

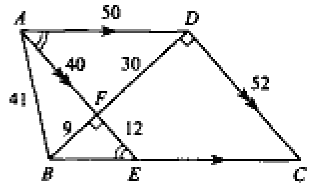
By Pythagoras in $\triangle AFD$,

$$FD^2+40^2=50^2$$
$$FD=30$$

Since AD is parallel to BC, $\angle FAD=\angle FEB$. Therefore, $\triangle AFD$ is similar to $\triangle EFB$, so

$$\frac{AF}{FD}=\frac{EF}{FB}\text{ or }\frac{40}{30}=\frac{EF}{9}\text{ or }EF=12.$$

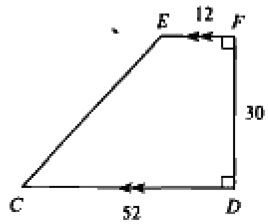
Since AE is perpendicular to BD and DC is perpendicular to BD, then AE is parallel to DC, so $AECD$ is a parallelogram. Thus, $DC=AE=52$.



Now consider quadrilateral $FECD$.

This quadrilateral is a trapezoid, so

$$\text{Area of }FECD=\frac{1}{2}(EF+CD)(FD)$$
$$=\frac{1}{2}(12+52)(30)$$
$$=960$$



ANSWER: (C)

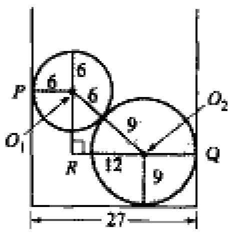
试卷十五第 19 题：

解：

标出有关尺寸和点如图所示。

$O_1O_2=6+9=15$

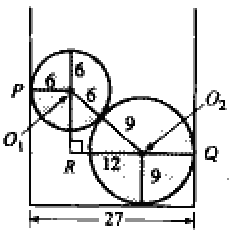
$O_1P=6$



Test 15, question 19:

Solution

We examine a vertical cross-section of the cylinder and the spheres that passes through the vertical axis of



$O_2Q=9$

作$\triangle O_1RO_2$,使$RO_1\perp O_1P$,$\angle O_1RO_2=90°$,则

$$PO_1+RO_2+O_2Q=27$$

$$RO_2=12$$

在$\triangle O_1RO_2$中,依据勾股定理可得到

$$O_1R=9$$

因此水的高度为:

下球的半径$+RO_1+$上球的半径$=9+9+6=24$

水的体积=高为24的圆柱体的体积-两个球的体积

$$=\pi(\frac{27}{2})^2(24)-\frac{4}{3}\pi(6)^3-\frac{4}{3}\pi(9)^3$$
$$=4\ 374\pi-288\pi-972\pi$$
$$=3\ 114\pi$$

因此所需水的体积为3 114π立方单位,故答案为(D)。

the cylinder and the centres of the spheres. (There is such a cross - section since the spheres will be pulled into this position by gravity.)

Let the centres of the spheres be O_1 and O_2, as shown.

Join the centres of the spheres to each other and to the respective points of tangency of the the spheres to the walls of the cylinder.

Then $O_1O_2=6+9=15$ (O_1O_2 passes through the point of tangency of the two spheres),

$O_1P=6$ and $O_2Q=9$, using the radii of the spheres.

Next, draw $\triangle O_1RO_2$ so that RO_1 is perpendicular to O_1P and $\angle O_1RO_2=90°$.

Then looking at the width of the cylinder, since $PO_1=6$ and $O_2Q=9$, we have

$$PO_1+RO_2+O_2Q=27$$

$$RO_2=12$$

By Pythagoras in $\triangle O_1RO_2$, we see that $O_1R=9$.

Then the depth of the water will be

Radius of lower sphere $+RO_1+$ Radius of higher sphere $=9+9+6=24$.

So

Volume of water = (Volume of cylinder to height of 24) - (Volume of spheres)

$$=\pi\left(\frac{27}{2}\right)^2(24)-\frac{4}{3}\pi(6)^3-\frac{4}{3}\pi(9)^3$$
$$=4\ 374\pi-288\pi-972\pi$$
$$=3\ 114\pi$$

Therefore, the volume of water required is 3 114π cubic units

ANSWER: (D)

试卷十五第20题:

解:

用第二个方程减去第一个方程,得到:

$$k^2x-kx-6=0$$
$$(k^2-k)x=6$$
$$[k(k-1)]x=6$$

k和x均应为整数,因此$k(k-1)$应该是6的因子,即可能等于$\pm1,\pm2,\pm3,\pm6$。又考虑到$k(k-1)$为两个连续整数的乘积,最终得到$k=2,-1,3,-2$。

现列表如下,以检查y是否为整数[根据第一个方

Test 15, question 20:

Solution

Subtracting the first equation from the second,

$$k^2x-kx-6=0$$
$$(k^2-k)x=6$$
$$[k(k-1)]x=6$$

Since we want both k and x to be integers, then $k(k-1)$ is a factor of 6, ie. is equal to one of $\pm1,\pm2,\pm3,\pm6$. Now $k(k-1)$ is the product of two consecutive integers, so on this basis we can eliminate six of these eight possibilities to obtain

程，

$$y=\frac{1}{5}(kx+7)]:$$

k	x	y
2	3	$\frac{13}{5}$
-1	3	$\frac{4}{5}$
3	1	2
-2	1	1

因此共有 2 个 k 值满足要求，故答案为(B)。

$$k(k-1)=2 \text{ or } k(k-1)=6$$

which yields

$$k^2-k-2=0 \text{ or } k^2-k-6=0$$

and so $k=2,-1,3,-2$.

We now make a table of values of k, x and y to check when y is also an integer. (We note that from the first equation, $y=\frac{1}{5}(kx+7)$.)

k	x	y
2	3	$\frac{13}{5}$
-1	3	$\frac{4}{5}$
3	1	2
-2	1	1

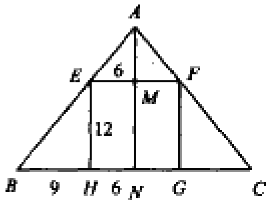
So there are two values of k for which the lines intersect at a lattice point.

ANSWER: (B)

试卷十六第 17 题：

解：

如图所示，对有关尺寸和点进行标注，由于$\triangle ABC$为等腰三角形，所以 M 为 EF 的中点，N 为 BC 的中点，A、M、N 在一条直线上，并且与 EF 和 BC 垂直。



由于正方形的边长是 12，因此有

$$EM=HN=6, EH=12。$$

另 $BC=30$，因此有 $BN=15$，$BH=19$。

因为 $EFGH$ 是正方形，所以 $EF // HG$，则$\angle AEM=\angle EBH$，$\triangle AME \backsim \triangle EHB$，

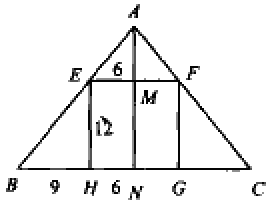
因此，$\frac{AM}{6}=\frac{12}{9}$或 $AM=8$

$\triangle AEF$ 的面积$=\frac{1}{2}\times 12\times 8=48$ 平方厘米，故答案为(D)。

Test 16, question 17:

Solution

Let M be the midpoint of EF and N be the midpoint of HG. By symmetry, N is also the midpoint of BC. Also, the line through A and M will also pass through N, and will be perpendicular to both EF and BC.



Since the side length of the square is 12, then

$$EM=HN=6 \text{ and } EH=12.$$

Since we are told that $BC=30$, then $BN=15$ and so $BH=9$.

Since $EFGH$ is a square, then EF is parallel to HG, and so $\angle AEM=\angle EBH$, ie. $\triangle AME$ is similar to $\triangle EHB$.

Therefore, $\frac{AM}{6}=\frac{12}{9}$ or $AM=8$.

Thus, the area of $\triangle AEF$ is $\frac{1}{2}(12)(8)=48\text{cm}^2$.

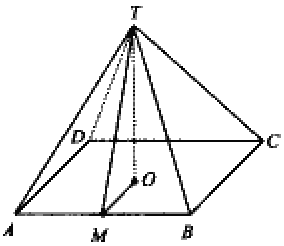
ANSWER: (D)

试卷十六第 18 题：

解：

根据题意画出角锥的图形，并进行标注。

A、B、C、D 为正方形底面的 4 个顶点。M 为 AB 边的中点，O 是正方形的中点，T 为锥角顶点，由于底面为正方形，四个三角形侧面也全等，因此 T 点正好在 O 点之上。



连接 TO、TM 和 MO。TO 垂直于底面，故也垂直于 OM，因此 $\triangle TOM$ 为直角三角形，且 $\angle MOT = 90°$

设 H 为角锥的高，则 $TO = H$，设底面的边长为 s，则 $MO = \frac{1}{2}s$ 设 $MT = h$。因为 O 是正方形底的中心，所以 M 是 AB 的中点。因为 $\triangle TAB$ 是等腰三角形。因此 $TM \perp AB$。根据勾股定理有：

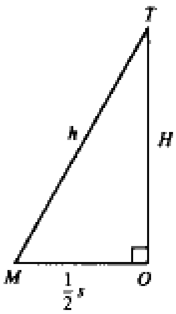
$$H^2 = h^2 - \left(\frac{1}{2}s\right)^2 = h^2 - \frac{1}{4}s^2$$

而 $s^2 = 1\ 440$，$\frac{1}{2}sh = 840$，因此

$$h^2 = \left(\frac{1\ 680}{s}\right)^2 = \frac{1\ 680^2}{1\ 440} = 1\ 960$$

因此，$H^2 = 1\ 960 - 360 = 1\ 600$，

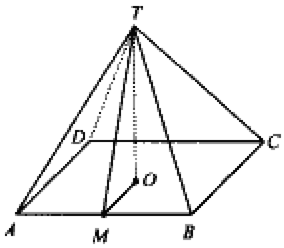
$H = 40$，故答案为(B)。



Test 16, question 18:

Solution

We label the pyramid with vertices A, B, C, , and D (the square base) and T the "top" vertex. Let M be the midpoint of side AB on the base, and O the centre of the square base.



Since the pyramid has a square base and each of the four triangular faces is identical, then the "top" vertex of the pyramid lies directly above the centre of the base, by symmetry, and so each of the four triangular faces is isosceles.

Join T to O T to M, and M to O.

Then TO is perpendicular to the square base by the symmetry of the pyramid, and so is perpendicular to OM.

Therefore, triangle TOM is right-angled at O.

Let H be the height of the pyramid, ie. $TO = H$.

Let s be the side length of the base of the pyramid.

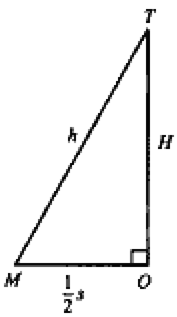
Then $MO = \frac{1}{2}s$, since O is the centre of the square and M is the midpoint of AB.

Let h be the length of MT. Since M is the midpoint of AB and $\triangle TAB$ is isosceles, then TM is perpendicular to AB.

So by Pythagoras,

$$H^2 = h^2 - \left(\frac{1}{2}s\right)^2 = h^2 - \frac{1}{4}s^2.$$

But the base is square, so its area is $s^2 = 1\ 440$, and the area of each of the triangular faces is $\frac{1}{2}sh = 840$, so



$$h^2 = \left(\frac{1\ 680}{s}\right)^2 = \frac{1\ 680^2}{1\ 440} = 1\ 960.$$

Therefore, $H^2 = 1960 - 360 = 1600$, and so $H = 40$.

ANSWER: (B)

试卷十六第19题：

解：

从数组{0,1,2,…,9}中由小到大取出数值，这样就可以保证 $a<b<c<d$，并且只要考虑它们的和是3的倍数。若4个数的和是3的倍数，这个和减去3仍是3的倍数。另外，每个数值都可以用 $3n-1$，$3n$ 或 $3n+1$ 表示。通过上述两种变换就可以将数组{0,1,2,…,9}转变成{0,1,-1,0,1,-1,0,1,-10}。

这样我们就只需从数组{0,1,-1,0,1,-1,0,1,-10}中取4个数并使它们的和为3的倍数(包括0)。

若取4个0，其和为0，是3的倍数。

若取3个0，留下的一个数可能是1或-1，其和不是3的倍数。

若取2个0，其他还可取2个1，2个-1，或1个1和1个-1，仅有后一种情况的和是3的倍数。

若取1个0，其他则要取3个1或3个-1。

若不取0，则要取2个1和2个-1。

因此还要分别考虑各种可能的情况：

第一种情况：0，0，0，0

只有一种组合方法。

第二种情况：0，0，1，-1

从4个0中取2个有6种方法，从3个1中取1个有3种方法，从3个-1中取1个有3种方法。因此一共有 $6\times3\times3=54$ 种组合方法。

第三种情况：0，1，1，1

从4个0中取1个有4种方法，从3个1中取3个有3种方法。因此一共有 $4\times1=4$ 种组合方法。

第四种情况：0，-1，-1，-1

与第三种情况相同，一共有4种组合方法。

第五种情况：1，1，-1，-1

从3个1中取2个有3种方法，从3个-1中取2个有3种方法。

因此一共有 $3\times3=9$ 种组合方法。

考虑各种情况，有 $1+54+4+4+9=72$ 种组合方法，故答案为(E)。

Test 16, question 19:

Solution

Since we are looking at choosing four different numbers from the set{0,1,2,…,9}, then there is only one way to write them in increasing order. So we only need to look at the number of ways of choosing four numbers so that their sum is a multiple of 3(that is, we do not need to worry about looking at the order of the choices).

If we take four numbers and add them up, then the fact that the sum is divisible by 3 (or not) is not affected when we subtract a multiple of 3 from any of the four numbers, since the difference between multiples of 3 is a multiple of 3.

Next, we can use the fact that every number can be written as a multiple of 3, or as one more or one less than a multiple of 3, ie. every integer can be written in the form $3n$, $3n+1$ or $3n-1$.

So combining these two facts, we can transform the set{0,1,2,3,4,5,6,7,8,9} into to the collection {0, 1, -1, 0, 1, -1, 0, 1, -1, 0}, for example by subtracting 6 from 5 to get -1. (A "set" cannot technically have more than one copy of the same element, whereas a "collection" can!)

So now we want to choose 4 numbers from the collection{0,1,-1,0,1,-1,0 ,1,-1,0}

whose sum is a multiple of 3(including possibly 0).

How can we do this?

If we choose 4 zeros, then the sum is $0+0+0+0=0$, which is a multiple of 3.

If we choose 3 zeros, then the remaining number chosen is a 1 or a -1, so the sum is not a multiple of 3.

If we choose 2 zeros, then we can choose two 1's, two -1's, or 1 and -1. Only the third choice gives a multiple of 3.

If we choose 1 zero, then to get a multiple of 3, we must choose three 1's or three -1's.

(You might want to check that no other combination works!)

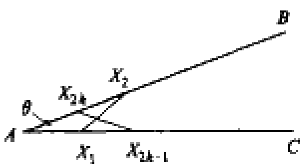
If we choose 0 zeros, then to get a multiple of 3, we must choose two 1's and two -1's (otherwise we choose three of one kind and one of the other, which will not give a multiple of 3).

试卷十六第 20 题：

解：

设可从被“系上”的角为 θ 并且有 $2k$ 个系点。

首先可以看到图形是对称的，这是因为：



So now we must count the number of choices for each case:

Case 1: 0, 0, 0, 0

Since there are only four zeros, there is only 1 way to choose them. (Recall that this corresponds to choosing 0, 3, 6 and 9, whose sum is indeed divisible by 3.)

Case 2: 0, 0, 1, −1

We must choose two zeros from four zeros, and one each of 1's and −1's from collections of three.

If we have 4 objects A, B, C, D then the number of ways of choosing 2 objects is 6 (AB, AC, AD, BC, BD, CD), and if we have 3 objects, then the number of ways of choosing 1 object is 3. (This just means that there are 6 ways to choose 2 zeros from 4 possibilities.)

So the total number of choices here is $6 \times 3 \times 3 = 54$, since *for each* choice of two 0's, we have 3 choices for the 1, and 3 choices for the −1.

Case 3: 0, 1, 1, 1

We must choose one 0 from four zeros, and three 1's from 3. There are 4 ways to choose the zero and 1 way to choose the three 1's, Thus there are a total of 4 ways of making this selection.

Case 4: 0, −1, −1, −1

Similarly to Case 3, there are 4 possibilities.

Case 5: 1, 1, −1, −1

We must choose two 1's from three, and two −1's from three. There are 3 ways to make each of these choices, or $3 \times 3 = 9$ ways in total.

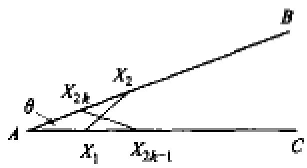
Therefore, there are $1 + 54 + 4 + 4 + 9 = 72$ ways in total of choosing the numbers.

ANSWER: (E)

Test 16, question 20:

Solution

Suppose that the angle θ is an acute laceable angle with $2k$ points in the lacing. We need to determine what values of θ are possible.



$$AX_1 = X_1X_2 = X_{2k-1}X_{2k} = X_{2k}A$$

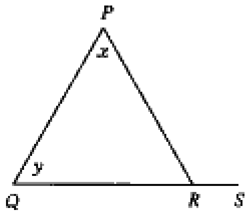
这样也可以证明$\triangle AX_1X_2 \cong \triangle AX_{2k}X_{2k-1}$

$$AX_2 = AX_{2k-1}$$

同样也可以证明 AB 和 AC 两条边上对应点到 A 的距离相等。

具体地讲，$AX_k = AX_{k+1}$，这样$\triangle AX_kX_{k+1}$为等腰三角形，$\angle AX_kX_{k+1} = \angle AX_{k+1}X_k = \frac{1}{2}(180° - \theta)$

由于三角形的一个外角等于与它不相邻的两个内角之和，另外$\triangle AX_1X_2$ 是等腰三角形，因此有：



$\angle X_1AX_2 = \angle AX_2X_1 = \theta$

$\angle X_2X_1C = 2\theta$

$\triangle X_1X_2X_3$ 是等腰三角形，因此有

$$\angle X_2X_1X_3 = \angle X_2X_3X_1 = 2\theta$$

$$\angle X_3X_2C = 3\theta$$

依此类推，有$\angle X_kX_{k-1}X_{k+1} = \angle X_kX_{k+1}X_{k-1} = k\theta$

而$\angle AX_{k+1}X_k = \angle X_{k-1}X_{k+1}X_k$

所以有：

$$\frac{1}{2}(180° - \theta) = k\theta$$

$$180° = 2k\theta + \theta$$

$$\theta = \frac{180°}{2k+1}$$

因为 θ 是整数，所以 $2k+1$ 必须能被 180 除尽。k 的取值为：1,2,4,7,22，对应的角度为 60°,36°,20°,12°和 4°，故答案为(C)。

First, we can note that the diagram must be symmetrical, since

$$AX_1 = X_1X_2 = X_{2k-1}X_{2k} = X_{2k}A$$

and so the two triangles $\triangle AX_1X_2$ and $\triangle AX_{2k}X_{2k-1}$ are isosceles with equal base angles and equal legs, and thus congruent, so $AX_2 - AX_{2k-1}$.

Continuing this, we can show that each pair of corresponding points on the rays AB and AC are the same distance from A.

In particular, $AX_k = AX_{k+1}$. Thus $\triangle AX_kX_{k+1}$ is isosceles and so $\angle AX_kX_{k+1} = \angle AX_{k+1}X_k = \frac{1}{2}(180° - \theta)$.

Next, we will develop a second expression for one of these two angles involving θ. To do this, we need the fact that if we know two angles of a triangle, then we can calculate the "external angle" of the triangle, ie. in the diagram, $\angle PRS = x + y$, since

$\angle PRS = 180° - \angle PRQ = 180° - (180° - x - y) = x + y$.

Since $\triangle AX_1X_2$ is isosceles, then $\angle X_1AX_2 = \angle AX_2X_1 = \theta$ and so by the external angle, $\angle X_2X_1C = 2\theta$.

Since $\triangle X_1X_2X_3$ is isosceles, then $\angle X_2X_1X_3 = \angle X_2X_3X_1 = 2\theta$, and so by the external angle in $\triangle AX_2X_3$, $\angle X_3X_2C = 3\theta$.

Continuing in this way, $\angle X_3X_2X_4 = X_3X_4X_2 = 3\theta$, and so on, eventually reaching

$$\angle X_kX_{k-1}X_{k+1} = \angle X_kX_{k+1}X_{k-1} = k\theta.$$

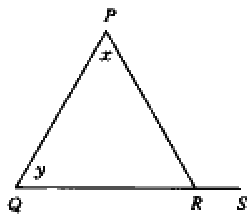
(Try this out in the diagram given in the problem.)

Therefore, comparing our two equations for angle $\angle AX_{k+1}X_k = \angle X_{k-1}X_{k+1}X_k$, we obtain

$$\frac{1}{2}(180° - \theta) = k\theta$$

$$180° = 2k\theta + \theta$$

$$\theta = \frac{180°}{2k+1}$$



Since θ is an integer, $2k+1$ must be a divisor (an odd divisor that is at least 3) of 180. The divisors of 180 are 1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 30, 36, 45, 60, 90, and 180, with odd divisors 1, 3, 5, 9, 15, and 45.

Therefore, ignoring the 1, there are 5 possibilities for θ to be a laceable acute angle, namely 60°, 36°, 20°, 12° and 4°.

ANSWER: (C)

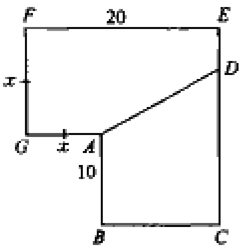
试卷十七第 17 题：

解：

设 $AG=x$，则 $FG=x$，

因此有：

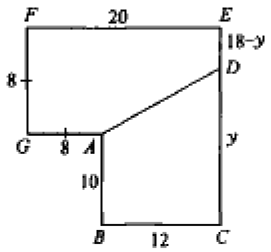
$$20(10+x)-10x=280$$
$$10x+200=280$$
$$x=8$$



其他各边的尺寸则标在图上。

设 $CD=y$，则 $ED=18-y$。

这时 $CBAD$ 可以被看作一个梯形，并且 $CD/\!/AB$，高 $BC=12$。梯形的面积应为整个房间面积的一半，即为 $\frac{280}{2}=140$。因此应有：



$$\frac{1}{2}(BC)(AB+CD)=140$$
$$\frac{1}{2}\times 12\times(10+y)=140$$
$$6(10+y)=140$$
$$10+y=\frac{70}{3}$$
$$y=\frac{40}{3}$$

即 CD 的长度为$\frac{40}{3}$，故答案为(E)。

Test 17, question 17:

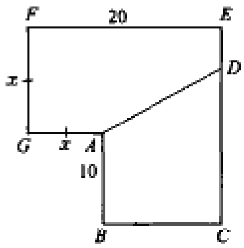
Solution

First, we determine the lengths of the sides of the rooms. Suppose that $AG=x$. Then $FG=x$.

So the room can be thought of as a rectangular room of width $FE=20$ and length $AB+FG=10+x$, with a rectangular corner of dimensions $AG=x$ by $AB=10$ removed.

Equating the area of the entire room with this way of visualizing it,

$$20(10+x)-10x=280$$
$$10x+200=280$$
$$x=8$$



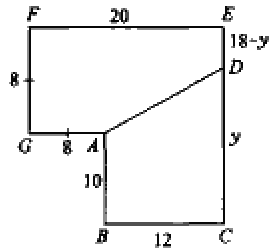
Therefore, the lengths of the sides of the room are (starting from B and proceeding clockwise) 10, 8, 8, 20, 18 and 12.

Let y now be the distance from C to D, the point where the new wall touches CE.

Now $CBAD$ can be viewed as a trapezoid with base CD and parallel side AB (since the room has square corners).

Also, the height of the trapezoid is $BC=12$. The area of this trapezoid is supposed to be 140, or half of the total area of the large room.

Therefore, since the area of the trapezoid is $\frac{1}{2}(BC)(AB+CD)$, we have



$$\frac{1}{2}\times 12\times(10+y)=140$$
$$6(10+y)=140$$
$$10+y=\frac{70}{3}$$
$$y=\frac{40}{3}$$

Also, the height of the trapezoid is $BC=12$. The area of this trapezoid is supposed to be 140, or half of the total area of the large room.

Therefore, since the area of the trapezoid is $\frac{1}{2}(BC)(AB+CD)$, we have

Thus, the distance from C to D is $\frac{40}{3}$.

ANSWER: (E)

试卷十七第 18 题：

解：

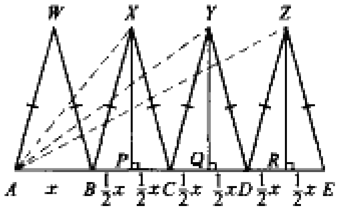
球以 4 米/秒的速度向麦可斯滚去，麦可斯以 8 米/秒的速度向球跑去。球距离麦可斯有 30 米，这样他需要$\frac{30}{4+8}=2.5$ 秒即可碰到球。相反，米切尔则需要$\frac{15}{9-4}=3$ 秒才能碰到球。所以，麦可斯先得到球。在 2.5 秒时米切尔跑了 $5\times2.5=12.5$ 米，即在麦可斯已经拿到球时，米切尔离球还有 2.5 米，故答案为(C)。

试卷十七第 19 题：

解：

现将构成的新三角形的三边用 x 值表示。

如图所示，从 X、Y、Z 向 AE 作垂线，垂足分别为 P、Q 和 R，由于每个三角形都是等腰三角形，因此有 $BP=PC=CQ=QD=DR=RE=\frac{1}{2}x$。



考虑$\triangle ARZ$，$\angle ARZ=90^\circ$。因为 $AZ=AE=4x$，根据勾股定理有：

$$AR^2+RZ^2=AZ^2$$

$$RZ^2=(4x)^2-\left(\frac{7}{2}x\right)^2$$

$$RZ^2=\frac{15}{4}x^2$$

即每个等腰三角形的高的平方为$\frac{15}{4}x^2$。

因此，$AY^2=AQ^2+QY^2=\left(\frac{5}{2}x\right)^2+\frac{15}{4}x^2=10x^2$，$AY=\sqrt{10}x$

$AX^2=AP^2+PX^2=(\frac{3}{2}x)^2+\frac{15}{4}x^2=6x^2$，$AX=\sqrt{6}x$

Test 17, question 18:

Solution

The ball is rolling towards Marcos at 4 m/s and he is running towards it at 8 m/s, so he gains 12 metres per second on the ball. Since he starts 30 m from the ball, it will take him $\frac{30}{12}=2.5$ s to reach the ball.

The ball is rolling away from Michael at 4 m/s and he is running at 9 m/s, so he is gaining 5 m/s on the ball. Since he starts 15 m behind the ball he would catch up to the ball in 3 s if it continued to roll.

Thus, Marcos gets to the ball first. After 2.5 s, Michael has gained $5(2.5)=12.5$ m on the ball, so is 2.5 m from the ball when Marcos touches it first.

ANSWER: (C)

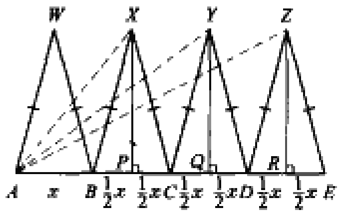
Test 17, question 19:

Solution

First, we determine the lengths of the sides of the new triangle, in terms of x.

We drop perpendiculars from X, Y and Z to points P, Q and R, respectively, on the line AE. Since each of the four triangles is isosceles, then

$$BP=PC=CQ=QD=DR=RE=\frac{1}{2}x.$$



Consider triangle ARZ, Which is right-angled at R. Since $AZ=AE=4x$, then by the Pythagorean Theorem,

$$AR^2+RZ^2=AZ^2$$

$$RZ^2=(4x)^2-\left(\frac{7}{2}x\right)^2$$

$$RZ^2=\frac{15}{4}x^2$$

so the square of the height of each of the four isosceles triangles is $\frac{15}{4}x^2$.

因此新的三角形的边长分别为$\sqrt{6}x$，$\sqrt{10}x$ 和 $4x$。由于$(\sqrt{6}x)^2+(\sqrt{10}x)^2=(4x)^2$，所以新三角形为直角三角形，其斜边为 $4x$。因此新三角形的面积为

$\frac{1}{2}(\sqrt{6}x)(\sqrt{10}x)=\frac{1}{2}\sqrt{60}x^2=\sqrt{15}x^2$

根据题意要求$\sqrt{15}x^2<2\ 004$，则 $x<\sqrt{\frac{2\ 004}{\sqrt{15}}}\approx 22.747$，因此 x 的最大整数值为 22，故答案为(E)。

Thus, $AY^2=AQ^2+QY^2=\left(\frac{5}{2}x\right)^2+\frac{15}{4}x^2=10x^2$, so $AY=\sqrt{10}x$, and

$AX^2=AP^2+PX^2=\left(\frac{3}{2}x\right)^2+\frac{15}{4}x^2=6x^2$, so $AX=\sqrt{6}x$.

Thus, the new triangle has side lengths $\sqrt{6}x$ $\sqrt{10}x$ and $4x$. Since $(\sqrt{6}x)^2+(\sqrt{10}x)^2=(4x)^2$, then this new triangle is right-angled, with hypotenuse $4x$, and so has area $\frac{1}{2}(\sqrt{6}x)(\sqrt{10}x)=\frac{1}{2}\sqrt{60}x^2=\sqrt{15}x^2$.

We would like the area to be less than 2004, so $\sqrt{15}x^2<2\ 004$ or $x<\sqrt{\frac{2\ 004}{\sqrt{15}}}\approx 22.747$.

Therefore, the largest integer value of x that works is 22.

ANSWER: (E)

试卷十七第 20 题：

解：

首先将表达式改写成下列形式：

$$\frac{7x+1}{2}=\frac{2+(7x-1)}{2}=1+\frac{7x-1}{2}$$

$$\frac{7x+2}{3}=\frac{3+(7x-1)}{3}=1+\frac{7x-1}{3}$$

$$\vdots$$

$$\frac{7x+300}{301}=\frac{301+(7x-1)}{301}=1+\frac{7x-1}{301}$$

这样每个表达式都有相同的分子。另外要使$\frac{7x+1}{2}$不能约分，也就是要使$\frac{7x-1}{2}$不能约分。其他表达式也有同样的要求。

因此，现在的问题是要确定 $x(\leqslant 60)$有几个值，可以保证

$\frac{7x-1}{2},\frac{7x-1}{3},\frac{7x-1}{4},\cdots,\frac{7x-1}{301}$

都不能约分。也就是 $7x-1$ 与数从 2 至 301 都没有公因子。若 $x\leqslant 43$，则 $7x-1<301$，不需要考虑，故只要考虑，$x\geqslant 44$ 的情况。

若 x 为奇数，则 $7x-1$ 为偶数，故有公因子 2，所以也不需考虑。因此只要考虑 x 为 44,46,48,50,52,54,56,58 和 60 的情况，这时 $7x-1$ 的对应值为 307,321,335,349,363,377,391,405 和 419。321，363 和 405 有因子 3，故去除。

Test 17, question 20:

Solution

We start by rewriting each expression so that each has the same numerator:

$$\frac{7x+1}{2}=\frac{2+(7x-1)}{2}=1+\frac{7x-1}{2}$$

$$\frac{7x+2}{3}=\frac{3+(7x-1)}{3}=1+\frac{7x-1}{3}$$

$$\vdots$$

$$\frac{7x+300}{301}=\frac{301+(7x-1)}{301}=1+\frac{7x-1}{301}$$

For each of these expressions , the original fraction will be in lowest terms only when the fraction in the new expression is in lowest terms, i. e. $\frac{7x+1}{2}$ is in lowest terms only when $\frac{7x-1}{2}$ is in lowest terms.

So the original problem is equivalent to determining the number of positive integers x with $x\leqslant 60$ such that each of

$\frac{7x-1}{2},\frac{7x-1}{3},\cdots,\frac{7x-1}{301}$

is in lowest terms.

This is equivalent to determine the number of positive integers x with $x\leqslant 60$ for which $7x-1$ has no common factor with any of the integers from 2. to 301, inclusive.

377 有因子 13,故去除。
391 有因子 17,故去除。
307,349 和 391 为质数,因此 x 一共有 3 个值,故答案为(C)。

For x from 1 to 43, $7x-1$ will be actually equal to one of the integers from 2 to 301, so there will be a common factor.

So we must examine the integers from 44 to 60.

If x is odd, then $7x-1$ is even, and so has a common factor of 2, for example.

So we must examine the integers 44, 46, 48, 50, 52, 54, 56, 58, and 60.

The values of $7x-1$ for these integers are 307, 321, 335, 349, 363, 377, 391, 405and 419, respectively. We would like to determine how many of these have no common factor with any of the integers from 2 to 301.

The integers 321, 363 and 405 are divisible by 3, so they can be removed. The integer 335 is divisible by 5 and so can be removed. This leaves us with 307, 349, 377, 391, and 419.

307 is a prime number.

349 is a prime number.

377 is divisible by 13, so can be removed.

391 is divisible by 17, so can be removed.

419 is a prime number.

Each of these prime numbers is divisible only 1 and itself, so has no common factor with any of the integers from 2 to 301.

Therefore, there are 3 integers x with $x \leqslant 60$ for which the fractions are all in lowest terms.

ANSWER: (C)

词 汇 表

add [æd]
vt. 计算……总和
vi. 加，做加法

addition [ə'diʃən]
n. 加，加法

altitude ['æltitju:d]
n.（尤指海拔）高度

amount [ə'maunt]
n. 数量

arc [a:k]
n. 弧，弓形

area ['εəriə]
n. 范围，区域，面积

arithmetic [ə'riθmətik]
n. 算术，算法

assume [ə'sju:m]
vt. 假定

average ['ævəridʒ]
n. 平均，平均数
adj. 平均的

acute [ə'kju:t]
adj. 锐角的

angle ['æŋgl]
n. 角

base [beis]
n. 底

billion ['biljən]
n. 十亿
adj. 十亿的

bisector [bai'sektə(r)]
n. 二等分线，平分线

calculate ['kælkjuleit]
v. 计算

centimeter ['senti,mi:tə]
n. 厘米

circle ['sə:kl]
n. 圆周，圆

column ['kɔləm]
n. 列

common multiple
n. 公倍数

congruent ['kɔŋgruənt]
adj. 全等的

corner ['kɔ:nə]
n. 角

cube [kju:b]
n. 立方体，立方

calculation [,kælkju'leiʃən]
n. 计算

capacity [kə'pæsiti]
n. 容量

center ['sentə]
n. 中心
adj. 中央的

circular ['sə:kjulə]
adj. 圆形的

constant ['kɔnstənt]
n. 常数
adj. 不变的

coordinate [kəu'ɔ=dinit]
n. 坐标（用复数）

count [kaunt]
v. 数，计算
n. 计数，计算

cubic ['kju:bik]
adj. 立方体的，立方的

circumference [sə'kʌmfərəns]
n. 圆周

congruent ['kɔŋgruənt]
adj. 全等的

cross [krɔs]
adj. 交叉的

cube [kju:b]
n.立方体,立方

cylindrical [si'lindrik(ə)l]
adj.圆柱的

decimal ['desiməl]
adj.十进制的,小数的
n.小数

define [di'fain]
vt.定义

degree [di'gri:]
n.度数

diagonal [dai'ægənl]
adj.对角线的
n.对角线

diagram ['daiəgræm]
n.图表

diamond ['daiəmənd]
n.菱形

digit ['didʒit]
n.阿拉伯数字

dimension [di'menʃən]
n.尺寸

divide [di'vaid]
v.除

divisible [di'vizəbl]
adj.可除尽的

denominator [di'nɔmineitə]
n.分母

determine [di'tə:min]
v.确定

diameter [dai'æmitə]
n.直径

difference ['difərəns]
n.差额

divisor [di'vaizə]
n.除数,约数

double ['dʌbl]
adj.两倍的
vt.使加倍

division [di'viʒən]
n.除法

eighteen ['ei'ti:n]
adj.十八的,十八个的

equation [i'kweiʃən]
n.方程式,等式

expansion [iks'pænʃən]
n.展开

eight [eit]
num.八,第八

equal ['i:kwəl]
adj.相等的
vt.等于

equilateral [ˌi:kwi'lætərəl]
adj.等边的
n.等边形

equivalent [i'kwivələnt]
adj.相等的,相当的
n.相等

estimate ['estimeit]
v.估计
n.估计

evaluate [i'væljueit]
vt.估计,求…的值

even ['i:vən]
adj.偶数的
n.偶数

example [ig'za:mpl]
n.例子,实例,例题

expression [iks'preʃən]
n.式,表达式,符号

exterior [eks'tiəriə]
adj.外部的

equilateral [ˌi:kwi'lætərəl]
adj.等边的
n.等边形

express [iks'pres]
vt.表达,表示

fifth [fifθ]
adj.第五的

find [faind]
vt.得到

four [fɔ:]
num.四,四个

fraction ['frækʃən]
n.分数

face [feis]
n.表面

fifteen [ˈfifˈtiːn]
num. 十五

figure [ˈfigə]
n. 图形

first [fəːst]
adv. 首先,第一
adj. 第一的

five [faiv]
num. 五,五个

four [fɔː]
num. 四,四个

formula [ˈfɔːmjulə]
n. 公式

function [ˈfʌŋkʃən]
n. 函数

graph [grɑːf]
n. 图表,曲线图

greatest common divisor
n. 最大公约数,最大公因子

geometrical [dʒiəˈmetrikəl]
adj. 几何学的,几何的

hexagon [ˈheksəgən]
n. 六角形,六边形

half [hɑːf]
n. 一半
adj. 一半的

height [hait]
n. 高度,海拔

horizontal [ˌhɔriˈzɔntl]
adj. 水平的

how [hau]
adv. (指范围,程度,数量,价值)多少,多么

hundred [ˈhʌndrəd]
num. 百,百个

hectare [ˈhektɑː]
n. 公顷(等于1万平方米)

hyperbola [haiˈpəːbələ]
n. 双曲线

hypotenuse [haiˈpɔtinjuːz]
n. 直角三角形之斜边

inscribe [inˈskraib]
v. 使内切

integer [ˈintidʒə]
n. 整数

inequality [ˌini(ː)ˈkwɔliti]
n. 不等式

intersect [ˌintəˈsekt]
vi. (直线)相交,交叉

intersection [ˌintə(ː)ˈsekʃən]
n. 交集,交叉点

isosceles [aiˈsɔsiliːz]
adj. 二等边的,等腰的

infinite [ˈinfinit]
adj. 无限的,无数的

interior [inˈtiəriə]
adj. 内部的

isosceles [aiˈsɔsiliːz]
adj. 二等边的,等腰的

kilometer [ˈkiləmiːtə]
n. 千米,公里

length [leŋθ]
n. 长度

liter [ˈliːtə]
n. 公升

least common multiple
n. 最小公倍数

line [lain]
n. 直线

less [les]
adj. 少的,小的

line segment
线段

mathematics [ˌmæθiˈmætiks]
n. 数学

maximum [ˈmæksiməm]
n. 最大量
adj. 最大极限的

mean [miːn,min]
adj. 平均的
n. 平均数

meter [ˈmiːtə]
n. 米,公尺

midpoint [ˈmidˌpɔint]
n. 中点,正中央

map [mæp]

n.地图,图

mark [ma:k]
n.分数
vt.打分数

mass [mæs]
n.质量

measure [ˈmeʒə]
vt.测量

million [ˈmiljən]
num.百万,百万个

minimum [ˈminiməm]
adj.最小的,最低的

mixed number
n.带分数

multiply [ˈmʌltiplai]
v.乘

number [ˈnʌmbə]
n.数,数字

numerator [ˈnju:məreitə]
n.分子

negative [ˈnegətiv]
n.负数
adj.负的

nine [nain]
num.九,九个

ninety [ˈnainti]
num.九十

numerical [nju(:)ˈmerikəl]
adj.数字的,用数表示的

natural number
自然数

odd [ɔd]
adj.奇数的

one [wʌn]
num.一,一个

operation [ˈɔpəˈreiʃən]
n.运算

octagon [ˈɔktəgən]
n.八边形,八角形

perfect square
n.完全平方

positive [ˈpɔzətiv]
adj.正的

prism [ˈprizəm]
n.棱柱

product [ˈprɔdəkt]
n.乘积

parallel [ˈpærəlel]
adj.平行的

per [pə:]
prep.每一

percent [pəˈsent]
n.百分比,百分数

percentage [pəˈsentidʒ]
n.百分数,百分率,百分比

plus [plʌs]
prep.加上

polygon [ˈpɔligən]
n.多角形,多边形

prime [praim]
n.质数

probability [ˌprɔbəˈbiliti]
n.概率

proportion [prəˈpɔ:ʃən]
n.比例

pyramid [ˈpirəmid]
n.角锥、棱锥

parabola [pəˈræbələ]
n.抛物线

pentagon [ˈpentəgən]
n.五角形,五边形

parallelogram [ˌpærəˈleləgræm]
n.平行四边形

perfect cube
完全立方

perimeter [pəˈrimitə]
n.周长,周界

perpendicular [ˌpə:pənˈdikjulə]
adj.垂直的,正交的

point [pɔint]
n.点,分数

polynomial [ˌpɔliˈnəumjəl]
n.多项式

quadrilateral [ˈkwɔdriˈlætərəl]
n.四边形

quotient [ˈkwəuʃənt]
n. 商

quarter [ˈkwɔːtə]
num. 四分之一

radius [ˈreidjəs]
n. 半径

ratio [ˈreiʃiəu]
n. 比,比率

rectangle [ˈrektæŋgl]
n. 长方形,矩形

rectangular [rekˈtæŋgjulə]
adj. 矩形的,成直角的

regular [ˈregjulə]
adj. 等边的

remainder [riˈmeində]
n. 余数

rhombus [ˈrɔmbəs]
n. 菱形,斜方形

row [rəu]
n. 行

reciprocal [riˈsiprəkəl]
adj. 倒数的

right [rait]
adj. 直角的

root [ruːt]
n. 根

real number
实数

region [ˈriːdʒən]
n. 区域

segment [ˈsegmənt]
n. 段

sequence [ˈsiːkwəns]
n. 数学

seven [ˈsevən]
num. 七,七个

side [said]
n. 边

six [siks]
num. 六,六个

size [saiz]
n. 大小,尺寸

square root
平方根

subtract [səbˈtrækt]
v. 减去,减

suppose [səˈpəuz]
vt. 假设

surface area element
表面积

scale [skeil]
n. 比例

second [ˈsekənd]
n. 秒
num. 第二

sector [ˈsektə]
n. 扇形

sequence [ˈsiːkwəns]
n. 序列

series [ˈsiəriːz]
n. 级数

seventh [ˈsevənθ]
num. 第七

shape [ʃeip]
n. 外形

sign [sain]
n. 符号

simplify [ˈsimplifai]
vt. 简化

square [skwεə]
n. 正方形

solid [ˈsɔlid]
n. 立体

straight [streit]
adj. 直的

subtraction [səbˈtrækʃən]
n. 减少

sum [sʌm]
n. 总数,和

surface [ˈsəːfis]
n. 表面

symmetric [siˈmetrik]
adj. 相称性的

satisfy [ˈsætisfai]

vt. 满足

semi ['semi]
n. 半

simplify ['simplifai]
vt. 简化

slope [sləup]
n. 斜率

solution [sə'lu:ʃən]
n. 解答, 解决

sphere [sfiə]
n. 球, 球体, 范围

square [skwεə]
n. 正方形

ten [ten]
num. 十, 十个

term [tə:m]
n. 项

third [θə:d]
num. 第三, 三分之一

thousand ['θauzənd]
num. 一千, 一千个

three [θri:]
num. 三

time [taim]
n. 倍

trapezoid ['træpizɔid]
n. 梯形, 不等边四边形

triangle ['traiæŋgl]
n. 三角形

twelve [twelv]
num. 十二

twenty ['twenti]
num. 二十, 二十个

two [tu:]
num. 二, 两个

tangent ['tændʒənt]
adj. 切线的, 相切的

tenth [tenθ]
num. 第十, 十分之一

than [ðæn]
prep. 与…相比较

total ['təutl]
n. 总数
adj. 总的

triple [tripl]
n. 三倍数
adj. 三倍数

twice [twais]
adv. 两次, 两倍

trapezium [trə'pi:zjəm, -ziəm]
n. 不等边四边形, 梯形

volume ['vɔlju:m]
n. 体积

value ['vælju:]
n. 值

variable ['veəriəbl]
n. 变数
adj. 变量的

vertex ['və:teks]
n. 顶点

vertical ['və:tikəl]
adj. 垂直的

width [widθ]
n. 宽度

zero ['ziərəu]
n. 零点
num. 零